# LETTERS,

AND

Divers other mixt Discourses of Natural Philosophy, And Arts.

BODLEIANA BIBLIOTHECA

Many of which, were formerly Published in the *Philosophicall Transactions* of Mr. *Oldenburg*, and part in the *Philosophicall Collections* of Mr. *Hooke*, and else where.

ALL

Which are now *Revised*, *Augmented*, and to them are *Added* very many other matters of the same Nature, not before Published.

---

ALSO,

An Intire *TREATIS* of the Nature and Use of COLOURS, in OYL PAINTING.

with a Catalogue of Books published by M. L.

---

Written by *M. Lister*, *F.* of the *R. S.*

---

YORK,

Printed by *J. White* for the Author. 1683.

# LETTERS.

*Some Obſervations*
*Concerning the odd* Turn *of ſome* Shell-ſnailes, *and the* darting of Spiders, *communicated to Mr.* J. W *and Publiſhed in the* Philoſophicall Tranſactions *N.*50. 1669.

Sir, I Can deny you nothing, and you may do what you pleaſe with the Notes I ſend you. You would know of me (you ſay) what I have obſerved concerning the *Odd Turn* of ſome *Shell-ſnailes* with us in England, and the *Darting of Spiders.*

I will tell you then of the *firſt*, that I have found two (*a*) ſorts of them, eaſily to be diſtinguiſht one from the other, and from all beſides, becauſe the *Turn* of the wreathes is from the right hand to the left, contrary to what may be ſeen in common Snailes. They are very ſmall, and might therefore well eſcape thus long the more Curious Naturaliſt; neither of them much exceeding, at leaſt in thickneſs, a large Oat-corne.

The *firſt* I thus deſcribe: The open of the ſhell is pretty round, and the ſecond turne of wreaths is very large for the proportion, and the reſt of the wreaths, about the number of ſix, are ſtill leſſon'd to a point. This Turbin or Conical figure is well near a quarter of an inch; the colour of the ſhell is duſkiſh, yet when the ſhrunk animall gives leave, you may ſee day through it, and then it is of a yellowiſh colour. Theſe ſhells are extream brittle and tender, ſo that I cannot ſend them in a Letter: You may gueſs at the figure, if I tell you, they are ſom-thing like thoſe of *Aldrovandus de Teſtaceis*, markt P. 359. *Turbinum levjum.*

Of the *ſecond* ſort (*b*) I ſend you incloſed at aventure halfe a dozen; (you ſee, in that I can ſo plentifully repair the loſs of the former, that they are not very rare;) they ſeem to be much ſtronger and thicker ſhel'd; they are well near halfe as long again as the other, and as ſlen-

der; they have the exact figure of an Oat-corn, being as it were pointed at both ends, and the middle a little ſwelled. The open of the ſhell is not exactly round there being a peculiar *Sinus* in the lower part thereof. I think, you may number above 10. Spires, having their turn from the right hand to the left. The colour of the Shell is of a dark and reddiſh brown.

There are two ſorts of this make deſcribed, and with their reſpective Cutts, in *Fabius Columna*; but ours agree not with them in any thing more than the odd Turn: though it's true, that the other, the third there deſcribed, and call'd by him *Cochlea Terreſtris turbinata et ſtirata*, (*c*) is very frequent in the road 'twixt Canterbury and Dover, and likewiſe in ſome woody parts of the Woles in Lincoln-ſhire. There are odd differences in this very Snaile very remarkable, as its having but one pair of horns (if I miſtake not,) as alſo a hard ſhelly cover; its manner of wearing that cover *&c.* which I leave to another opportunity and place.

And to return to our two new deſcribed Snailes, they, when they creep, lift up the point of their ſhells towards a perpendicular, and exert with part of their body two pair of horns, as moſt of their kind do.

In *March* they are ſtill to be found in paires, *Ariſtotle* affirms all theſe kind of creatures to be of a *ſpontaneous* birth, and no more to contribute to the production of one another, then Trees, and therefore to have no diſtinction of Sex. I have no reaſon to ſubſcribe to his authority, ſince I have ſeen ſo many of them pair'd, and in the act of Venery. That they engender then, is moſt certain; but whether thoſe, that are thus found coupled, be one of them a male, and the other female, or rather, as you *firſt* obſerv'd, and publiſhed to the World in the *Catalogue of Plants* growing wild about *Cambridge*, that they are both male and female and do in the act of generation both receive into themſelves, and immit alike

penis

*penis* (as it seems probable to any man that shall part them) I leave to further and more minute discovery to determine.

Moreover we find in *Aristotle* a Circle of other parts, but of those we find no mention at all. However the Romans knew something extraordinary of these kind of Animals, that made them so choice of them as to recken them among their most delicate food, and use all care and diligence to breed and fat them for their Tables at large discribed to us by *Varro*. Their tast and relish is none, methinks, of the most agreeable.

Of late, comparing *Bussy's Histoire Amoureuse de Gaule* with *Petronius Arbiter*, out of whom I was made to believe, he had taken two of his Lettes word for word, beside other Love intrigues; I find, in running him over, what satisfied me; not a little in this very subject of *Snailes*; *viz.* That these very Animals, as well as other odd things in Nature, as *Truffs*, *Mushrooms*, and no doubt too the *Cossi* or great worms in the Oak (another *Roman* dainty) were made use of by the Antients to incite Venery. You'l there find, that the distressed and feeble Lover prepares himself with a ragoust of Snailes necks, (*cervices Cochlearum*;) and indeed in this part it is that these strange *penes's* are to be found.

Mr. *Hook* does as it were promise the Anatomy of this Insect. It were surely worth his paines, and the Learn'd World would be obliged to him for a piece of this nature; nothing accuratly done of the inward part of any Insect, being yet published *

* When this was written, Malpigius de Bombyce was not not publisht.

These Snailes are to be found frequent enough under the loose barke of Trees, as old *Willows*, and in the ragged clefts of *Elmes* and *Oak &c.* And in no other places else, that I could observe.

You tell me, that it is generally concluded by Phylosophers, That the reason of the usuall *Turn* of *Snailes*

from the left to the right, is the like motion of the Sun, and that eſpecially more North-ward, there have not been hitherto diſcovered any in our parts of the contrary Turn to the Sun's motion. But this is not the only caſe, where they are out, who conſult not the Stores of Nature, but their own phancy. What I am further about to tell you concerning *Spiders*, is as evident an Inſtance againſt them.

The *long Threads* in the Aire in Summer, and eſpecially towards *September*, have been a ſtrange puzel to the wiſer World. It would divert you, though you know them as well as I, if I here reckoned up the ridiculous opinions concerning them; but I omit them, and proceed to tell you the certain and immediat Authors of them, and how they make them.

I ſay then, that all Spiders, that ſpin a thread, (thoſe which we call *Shepherds* or long-legged Spiders, never doe;) are the markes of theſe threds, ſo much wondred at, and in ſuch infinite quantities every where.

I ſent you the laſt Summer a Catalogue of *thirty* ſort, of Spiders, that I had diſtinguiſht here with us in England; and I muſt confeſs, I had well near compleated that number, with many other Experiments concerning them, before I diſcovered this ſecret. You muſt not expect from me any thing more, then what you demanded of me; for as for other Experiments, I reſerve them till our meeting.

I had exactly marked all the way of Weaving, uſed by any ſorts of them, and in thoſe admirable works I had ever noted that they ſtill let down the Thred they make uſe of; and draw it after them. Happily at length in neerly attending on one, that wrought a nett, I ſaw him ſuddenly in the mid-work to deſiſt, and turning his taile into the wind to dart out a thread with the violence and ſtreame, we ſee water forced out of a *ſquirt or ſyring pipe*: This thread taken up by the wind, was

in

in a moment emitted ſome fathoms long, ſtill iſſuing out of the belly of the Animal; by and by the Spider leapt into the aire, and the thread mounted her up ſwiftly.

And after this firſt diſcovery, I made the like Obſervation in all the ſorts of Spiders, I had before diſtinguiſhed; and I found the Air filled with young and old, ſailing on their threads, and undoubtedly ſeizeing Gnats and other Inſects in their paſſage; there being often as many ſeſt ſignes of ſlaughter, as the leggs, wings of Flyes *&c.* on thoſe threads, as in their webbs below.

One thing yet was a wonder to me, *viz.* That many of theſe threads, that came down out of the Air, were not ſingle, but ſnarled and with complicated woolly locks, now more now leſs; and that on thoſe I did not elways find Spiders, though many times I had found two or three upon one of them: Whereas when they firſt flew up, the thread was ſtill ſingle, or but little tangled, or, it may be, thicker in one place then in another. In the end, by good attention I plainly found, what ſatiſfied me abundantly, and that was this; That I obſerved them to get to a top of a ſtalk or bough, or ſum ſuch like thing, where they exerciſe this darting of threads into the air; and if they had not a mind to ſail, they ſwiftly drew it up again, winding it up with their fore-feet over the head into a lock, or brok it off ſhort, and let the air carry it away. This they will do many times together, and you may ſee of them, that have chaines to theſe locks or ſnarled thread before them, and yet not taken flight.

Again, I found, that after the firſt flight, all the time of their ſailing they make locks, ſtill darting forth freſh ſupplyes of thread to ſport and ſaile by.

It is further to be noted, that theſe complicated threads are much more tender, then our houſe-webbs.

In Winter and at Chriſtmas I have obſerved them

buſy a darting, but few of them ſaile then, and therefore but ſingle threads only are to be ſeen; And beſides, they are but the young ones of laſt Autumns hatch, that are then employed; and it is more than probable, that the great ropes of Autumne are made onely by the great ones, and upon long paſſages and Summer weather, when great numbers of pray may invite them to ſtay longer up.

But I ceaſe to be tedious: I have many Experiments by me to ſatisfiy many doubts, that may be made, *viz.* infinite number of theſe Inſects, and their numerous Increaſe; and beſides how ſtrangely they are able to furniſh and husband great quantities of matter out of ſo ſmall a bulk *&c.*

You may expect all from me after another ſummers leiſure, which at leaſt I think neceſſary to confirm to me theſe; and other things concerning their *Generation* and *Poiſon*. What I have ſaid at preſent, is ſuch as I have certainly obſerved; and you may take the Truth of theſe Obſervations for excuſe of the ill Texture of them.

Note, (*a*) *I have ſince alſo found one ſort of* Snaile *of this Turn, amongſt the Aquatik or Freſh water kind: ſee my Book.* (*b*) *This I have cauſed to be elegantly drawn in the Plate, Publiſhed in the Appendix to that Book,* 1680. (*c*) *of this ſee the ſaid Book.*

*Extract*

*Extract of a Letter, written to Mr.* Oldenbourgh, *and publiſhed in the Philoſoph: Tranſactions, N.* 68. 1670. *about an* Inſect, *which beſides* Piſmiers, *may probably yield an Acid juice. Alſo about the winter* Bleeding *of the* Sycamore Tree.

SIR, Concerning the Acid liquour of Piſmiers, I have very lately received from Mr. *Wray* the Account (I ſuppoſe you have it by this time,) that was ſent him from Mr. *Fiſher* and Mr. *Jeſſop*; wherein theſe two laſt Gentlemen make this further Inquiry, whether there be any other Inſect, or Animal, Fleſh or Fiſh, that will afford an Acid Juice; they having with great induſtry tryed many *ſpecies* amongſt Inſects, and other Animals, without lighting on the like Acid liquor. I am of the mind, there are; and a ready way to find ſuch out, may be, that having obſerved, that a Piſmire bruiſed and ſmelt to, emits a ſtrange fiery and piercing ſavour, like the leaſe of the Herb, by *Botaniſts* called *Flammula*, broken at one's noſtrills; by this means I have, ſince Mr. *Wray* put the queſtion to me, found an Inſect, which I ſuſpect, may yeild an Acid liquour; as well as the Piſmire; and that is the *Long and Round-bodied lead-coloured Julus*, diſtinguiſhed from all other *Multipeds* in that their innumerable leggs are as ſmall as hair, and white and in going they are moved like waves; not rare amongſt drier rubbiſh; no *Scolopendra*, ours being an harmleſs Inſect, and not armed with dangerous *forcipes*. The body of this *Julus* being bruiſed ſtrikes the noſtrils exceeding fiercely; but I have not yet any opertunity to furniſh my ſelfe with any quantity of them for farther trials. The Change of Colours in Flowers, *&c.* Is a ſubject I have a little conſidered, and you ſhall have my thoughts an Experimen a about it more a leiſure.

As to the *Bleeding of Sycamore*; the laſt year I winter'd at *Nottingham*, where I pierced a Sycamore about the

the begining of *November*; the turgeſcence of the Buds invited me thereto, and ſome hopes in improving the notion of Winter-bleedings, ſo happily diſcover'd by Mr. *Willughoby* and Mr. *Wray*. This ſucceeded ſo well with me, that I did afterwards engage my ſelfe in keeping a *Journal* throughout the whole Winter; from which Journal, I think I may note; 1. That the wounded Sycamore niver bled, neither in *November*, *December*, nor *January*, nor *February*, nor *March*, (which yet they did above 40. ſeveral times, that is, totally ceaſing and than beginning a new,) unleſs there *preceded* a ſenſible and viſible Froſt; for I had no other way of recording the temper of the Air. 2. That the Froſt did not always ſet a bleeding the wounds, they found made before they came, though ſometimes they did; but upon their breaking up, or very much relenting, the wounds either made in that inſtant of time, or made many months before, did never fail to bleed more or leſs. 3. That particularly upon the breaking up of the two great and long Froſts (the firſt of which hapn'd that year in that Country to be on the third of *January*; the ſecond, about the 12*th*. 13*th*. 14*th*. of *February*,) all the wounds ran moſt plentifully: ſo that ſuch times may be looked upon as the moſt proper ſeaſon of gathering great quantities of Juyce from this Tree. Removing into *Craven* the latter end of *March*, and thence to *London*, my Journal was diſcontinued; I had yet, upon my return from *London* unto *Craven*, ſome leaſure to proſicute it. Thoſe, I there wounded the latter end of *May*, did not bleed neither the remaining part of that month, nor the following months of *June* and *July*, but had the orifice of the wounds, made with a ſmall Auger, in a manner quite grown up, and would ſcarce admit a Pigeons feathers. Wherefore the 30*th*. of *July* I cut out a ſquare piece of about two inches of the barke of a large and well-grown

Sycamore

Sycamore, about my hight in the body of it: This wound began to run the next morning about 9 a clock, so as to drop; and that was all, and dryed up by 11 in the morning. it continued in like manner the 21 days following, that is as long as I had the oppertunity of obſerving it. The like cut I made in a young Sycamore the 8th of *Auguſt*; which in like manner bled the next morning, but ſtopp'd before 9 a clock. It did ſo for 2 or 3 days, but then totally drying. Afterwards removing to *York*, the firſt of *November* I here pierced, and otherwiſe wounded two Sycamores; and having obſerv'd them my ſelf at times, when, according to my former Obſervations made in *Nottingham-ſhire*, I might wel expect to have found them bleeding; yet they *never* ſtirr'd, that we could obſerve, to this day. Since *Mr. Wray* hath aſſured me, that thoſe of *Warwick-ſhire* bled the 16th of *November* laſt paſt copiouſly; and ſince the *Walnuttree* alſo. And ſo much for matter of fact.

To what cauſe we may truly refer this Anomalous Bleeding, is not eaſie to ſay. For my part, I am not apt to think, that there is ſuch a ſudden and extemporary Aſcent of Sap, at ſuch time as theſe Trees are moſt diſposd to bleed; but rather, that the Sap, already in all parts of the Tree, is ſome ways notably *alter'd* in its temper and conſiſtance: And this Bleeding by ſtreſs of weather may in theſe Trees probably be look'd upon as a violence done to their natures from an unkind Climate; conſidering the *Walnut* and *Sycamore* as ſtrangers, and not natives of England. 'Tis indeed true, there are many ſorts of *Engliſh* Plants, which will bleed in Winter; but note alſo, that ſuch Plants never refuſe to do ſo at any time of the year, no more than a Man, who may bleed a vein when he pleaſeth, But let the Hypotheſis be what it will, I am perſwaded, we ſhall have but dark and imperfect notions of the motion of the Juyces in Vegetables, until their true Texture be better diſcover'd. To conclude

this ſubject, I now put theſe two *Queries*; 1. Whether the Juyce of Trees, whil'ſt alive & vegete, can properly be ſaid, at any time of the year, to deſcend, or to be wanting in any part, or not to be therein in a much like quantity? 2. What condition the Soil is of, where ſuch Trees are planted, that ſhall either bleed or refuſe to do ſo; whether *Sandy*, as that of *Nottingham*; or a wet Clay, as that of the two Trees, I have obſerv'd here at *York*.

*An Extract of another Letter written* Febr. 8th. 1670. *Containing ſome Experiments about the Bleeding of the* Sycamore, *and other Trees; as alſo, a conſiderable Note of* Pliny *about the* Mulberry-Tree. Ibidem.

COncerning the *Bleeding* of the *Sycmore*, let me acquaint you with the following Experiment. The firſt inſtant it froze, the Wind at *North*; the Froſt and Wind continued (ſome little Snow and rain falling) the 2d, 3d, 4th, 5th, 6th, until the 7th in the morning, when the Wind came about to the South-Eaſt, and the weather broke up a pace. The Sycamores bled not all this while, but the 7th about Noon all Trees of that kind bled very freely, both at the Twigs and Body, and I ſtruck above a dozen.

At this ſame Critical ſeaſon I was willing to repeat the Experiment upon other Trees; and to this end I forthwith ſtruck the *Hawthorn*, *Hazel*, *Wild-Roſe*, *Gooſe-berry-buſh*, *Apple-tree*, *Cheery-tree*, *Blather-nut*, *Aprick-cock*, *Cherry-Lawrel*, *Vine*, *Walnut*; yet none bled but the laſt-named, and that faintly in compariſon of the *Sycamore*. This is conſonant to our former Experiments: And if it did happen (as I ſaid in my former Letter,) that theſe Sycamores bled not all this Winter afore at the wounds made the firſt of *November*, I do now think, that if new wounds had been ſtill made at every break of Froſt, ſome ſignes,

ſignes, at leaſt of our *York-ſhire* bleeding, might have been diſcover'd before now. But I affirm no more, than I have ſeen and tried.

In all the Monuments of the Antients, collected by the great induſtry of *Pliny*, I find but few inſtances of this nature. Amongſt thoſe few, there is one that is regiſtred with two or three remarkable circumſtances to our purpoſe. He tells us, that the Phyſitians of old, when they had a mind to draw the Juyce of the Mulberry-tree, were wont to ſtrike it skin-deep only, and that about two hours after Sun-riſe. This Experiment is twice mentioned by him, and in both places as a ſtrange *phænomenon*. We might make our Comment upon the places, but for this time are content only to tranſcribe the Text. *Lib.* 16. *c.* 38. *Mirum; hic (cortex) in Moro, Medicis ſuccum quærentibus, ferè horâ diei ſecundâ, lapide incuſſus manat, altius fractus ſiccus videtur.* Lib. 23. c. 7. *Mora in Ægypto & Cypro ſui generis, ut diximus, largo fœto abundant, ſummo cortice deſquamato, altiore plagâ ſiccantur; mirabili naturâ.*

*Extracts of divers Letters, Touching ſome Inquiries and Experiments of the* Motion of Sap *in Trees, and relating to the Queſtion of the* Circulation *of the ſame. Phi.* Traus. *N.* 70.

1. *January.* 28. 1670. *York.*

YOu may be pleaſed to put this *Quærie* alſo, concerning the Bleeding of the *Sycamore*: What condition the Soil is of, where ſuch Trees are planted, that ſhall either bleed, or refuſe to do ſo: whether Sandy, as that of *Nottingham*, or a wet Clay, as that of the two Trees, I have obſerved here at *York*. *

* Of both which, ſee this Obſervers Experiments formerly communicated, *No.* 68. *p.* 2067, 2068.

2. *Febr.* 8. 1670. *York.*

Concerning the Bleeding of the *Sycamore*, be pleased that I acquaint you with the following Experiments of very late date. The first instant it froze, the wind at North; the Frost and Wind continued (some little Snow now and then falling) the 2d, 3d, 4th, 5th, 6th, until the 7th in the morning, when the wind came about to the South-East, and the weather broke up a pace, the *Sycamores* bled not all this while; but the seventh about noon, all Trees of that kinde bled very freely both at the Twigs and Body, and I struck above a dozen.

At this same Critical season, I was willing to repeat the Experiment upon other Trees, and to this end I forthwith struck the *Haw-thorn*, *Hazel*, *Wild-Rose*, *Gooseberry-Bush*, *Apple-Tree*, *Cherry-Tree*, *Bladder-Nut*, *Apricock*, *Cherry-lawrel*, *Vine*, *Wal-nut*; yet none bled but the last nam'd, and that but faintly in comparison of the *Sycamore*. This is consonant to our former Experiments: And if it did happen, as I said in one of my former Letter*, that these *Sycamores* bled not all this Winter afore at the wounds made the first of *November*, I do now think, that if new wounds had been still made at every breach of Frost, some signes at least of our *York-shire* bleeding*, might have been discovered before now: But I affirm no more than I have seen and tried.

* See *No* 68. *p.* 2068.

* See the ground for this distinction in the same *Numb.* 68. *p.* 2067. 2068.

3. *Febr.* 15. 1670. *York.*

To continue our Experiments concerning the motion of the Sap in Trees; *Febr.* 11th, all was here cover'd with a white Frost betwixt 9 and 11 in the morning. The weather changing I made the Experiments, which follow, upon the *Sycamore*, *Walnut*, *Maple*. A twig cut asunder would bleed very freely from that part remaining

ing to the Tree; and, for the part ſeparated, it would be altogether dry and ſhew no ſigns of moiſture, although we held it ſome prety time with the cut end downward; But, if this ſeparated twig was never ſo little tipp'd with a knife at the other end, it would forthwith ſhew no moiſture at both ends. The ſame day, late in the after-noon, the weather very open and warm, a Twig cut off in like manner as in the morning, would ſhew no moiſture at all from any part. Theſe Experiments we repeated very many times with conſtant and like ſucceſs on all the Trees abvoe-mentioned. I enter'd this Experiment with theſe *Quaries* for the next opportuniry. 1. Whether a Twig, or the ſmall part of a Root cut aſunder, will not bleed faſter, upon the breaking up of a Froſt, from the part remaining to the Tree, than from the part ſeperated; and whether the part ſeperated will bleed at all, and ſhew no more ſignes of moiſtule, than a Twig cut from the top of the Tree, unleſs that ſmall Root be likewiſe cut off at the other end alſo? 2. Whether when it ſhall happen, that a *Sycamore* ſhall be found to bleed upon the ſetting in of a great Froſt, the top twigs and ſmall roots will not both of them bleed irregulier from the parts ſeparated, in proportion to their bigneſs? 3. And if it ſhall not ſo prove in the Tryal, that in cold weather the Sap moves *inwards* from Root and Branch to the Trunk to the extremities of both Root and Branch; I ſay, if this prove not ſo, whether there be any different motions of Sap at a time in the divers parts of one and the ſame Tree; and where ſuch motions of Sad begin, and whither they tend? 4. Whether the Sap, when it will run, moves longer in the Branches than in the Roots; or whether it begin not to move in all parts of a Tree at a time, and reſt every where at a time? 5. When it reſts, whether it retires to the Body of the Tree, from the Roots and Branches, or ſinks down to the

Root, or is any way ſpent by inſenſible ſteams, or is quiet and lodged in every part of the Tree in proportion?

I ſhall long to hear the ſucceſs of your Experiments in the Queſtion of the *Circulation* of the Sap. I have many years been inclin'd to think, that there is ſome ſuch motion in the Juyces of Vegetables. The reaſons which induced me, are; 1. Becauſe I finde, that all the Juyce of a Plant is no extravaſate and looſe, and like Water in a Spunge; but that there are apparent Veſſels in Plants, analagous to Veins in Animals: which thing is moſt conſpicuous and clear in ſuch Plants, whoſe Juyce is either White or Red, or Saffron colour'd; for inſtance, in each kind of Juyce we propoſe *Lactuca*, *Atractilis*, *Chelidonium majus*. 2. Becauſe that there are very many Plants (and theſe laſt named are of the number) whoſe Juyce ſeems never to be at reſt, but will ſpring at all times freely, as the Blood of Animals, upon Inciſion.

The way of Ligature by Metalline Rings, by you mention'd is an Expedient I have not uſed; but other Ligatures I have, upon a great number of our Engliſh Plants, not without the diſcovery of many curious *Phenomena*. The ſucceſs of an Experiment of this Nature upon *Cataputia minor Lobel.* was as followes: I tied a ſilk-thread upon one of the Branches of this Plant, as hard as might be, and not break the skin; there follow'd no greater ſwelling, that I could diſcern, on the one ſide than on the other; although in often repeating the Experiment, ſome ſilks were left hours and dayes unlooſed, and yet the dimple which the thread had made in the yielding branches, had a little raiſed the immediate ſides, but both alike: the Plant in like manner would bleed very freely both above and under the Tye. This was alſo, I thought, very remarkable, amongſt other things, in this Experiment, that in drawing the Raſour round about the branch juſt above or below the Tye, the Milky Juyce would ſuddenly ſpring out of infinite ſmall holes,

holes, besides the made orifice, for more than half an inch above and below the Tye: which seems to argue, that though there was no Juyce intercepted in appearance from any turgescence, (as in the like process upon the members of a Sanguineous Animal) yet the Veins were so over-thronged and full, that a large orifice was not sufficient to discharge the sudden *impetus* and pressure of a some-ways streighten'd Juyce.

I have endeavour'd many wayes to discover the Configuration of the Veins of Vegetables and their other constituent parts and Texture; but enough of this in one Letter.

4. *March* 17. 1670. *York.*

To the end that I might satisfie my self about some of the doubts I sent you, I have been most concern'd, according to former thoughts and inclinations, in examining the Truth of these Quærries, *viz. Whether Saps are not to be found at all seasons of the year in a much like Consistence and Quantity in the respective parts of a Vegetable; and what Communication one part of a Plant may have with another in relation to the Ascent and Decent of Sap?*

Now, because Sap is then said to Ascend from the Root, when it is found to move in Tapping; I lopp'd off certain Branches of a *Sycamore*, the morning betimes of a hard Frost (*Febr.* 21.) before they would bleed, or shew any signe of moisture. This I did to vary the *Efficient*, not willing to wait the Change of the Weather, and the *Suns* heat; but brought them within the Air of the *Fire*: And by and, as I expected, they bled apace, without being sensibly the warmer.

The Experiment repeated afforded me divers *Phænomena*, which follow; and proved *almost* an Universal way of Bleeding all sorts of Trees, even those, which of themselves would not shew any signes of moisture.

1. Poles of *Maple*, *Sycamore* and *Walnut*, cut down in open weather, and brought within the warmth of the Fire

Fire, did bleed in an instant. Also *Willow*, *Hazel*, *Cherry*, *Wood-bind*, *Blather-nut*, *Vine*, *Elder*, *Barbery*, *Apple-tree*, *Fug*, &c. *Whicking Egge-berry* Tree (i.e. *Padus Theophrasti*) tried in the same manner in *Craven*.

2. *Briar* and *Rasberry-rods* were more obstinate. *Ash* utterly refused, even heated hot.

3. Branches, that is, Poles with their tops entire and uncut bled also when brought to the Fire side; but seem not so freely to drink up their Sap again when inverted, as when made Poles.

4. The same *Willow-Poles*, left all night in the grass-spot, and returned the next day to the Fire-side, bleed afresh.

5. *Maple* and *Willow-Poles*, bleed and cease at pleasure again and again, if quickly withdrawn and balanced in the hand, and often inverted to hinder the Falling and and Expence of Sap: Yet being often heated, they will at length quite cease, though no Sap was at any time sensibly lost. And when they have given over bleeding, that is, shewing any moisture, by being brought within the warmth of the Fire, the Bark will yet be found very full of Juyce.

6. An hard Ligature made within a quarter of an inch of the end of a *Wood-bind* rod, did not hinder its bleeding at all when brought within the warmth of the Fire.

7. *Maple* and *Willow-Poles*, &c. quite *bared* of *Bark*, and brought to the Fire, will shew no moisture at all in any part.

8. One *Barbery*, or *Pipridge-pole* bared of its Bark, brought to the Fire, did shew moisture from within the more inward Circles, though not any from the outward.

9. *Maple* and *Willow-poles*, &c. *half* bar'd of Bark, woud bleed by the Fire, from the half onely of those Circles, which lay under the bark.

10. *Maple* and *Willow-poles*, split in two and planed, would

would not shew any moisture on the planed sides, but at the ends only.

11. A Pole of *Ivy* did of it self exudate and shew a liquid and yellowish rosin from the bark and near the pith; but when brought to the Fire-side, it bled a dilute, thin and colour-less Sap from the intermediat wood Circles.

12. A Pole of *Willow* (for Example) bent into a bow, will ouse its Sap freely, as in bleeding either spontaneously or by the Fire.

*Extract of a Letter, written from* York, *April* 8. 1671. *both in relation to the further Discovery of the Motion of Juyces in Vegetables, and removing some difference noted the in next fore-going Letter.*

SIR, Yours of the 4th instant came safe to my hands. This last Month hath been a busie time with me in my private concerns, so that I have but a few things to return to what you have been pleased to communicate to me, in relation to the further discovery of the Motion of Juyces in Vegetables. And I must acquaint you, that these Notes following are above 14 dayes old; for I have scarce busied my head, or put my hand to any Experiment of later date.

One or both ends of the pith of a *Willow-pole* seal'd up with hard wax, will yet freely bleed by the warmth of the Fire. This was tried, when the last Experiment, I sent you, were; and was then, I think, omitted.

*March* 23th, was the greatest Frost and Snow we have had this Winter in these parts about *York*. Some Twigs and Branches of the very same *Willow-tee*, as formerly, and likewise of many other Willow-trees, taken off this morning, *March* 23th, when brought within the Air of the Fire. would shew no moisture at all; no not when heated warm, and often and long turn'd.

*March* 24th, the ſame *Willow-branches*, which yeſterday would not bleed, and were thrown upon the Graſs-ſpot all night, ; did, both they and others, new cut down by the Fire-ſide, freely ſhew moiſture and bleed this morning upon the breaking up of the Froſt.

*Aſh-poles* and *branches* this day, nor yeſterday, would by the Fire-ſide, be no more moiſt, than when I formerly tried them.

The ſame morning *March* 24th, a Twig of *Maple*, which had had the top cut off the 7th of *February* laſt paſt. and which then bled, this day being quite taken off from the Tree, and brought within the Air of the Fire, and held with the formerly cut-end down-wards, did not run at all at the end, but held on in that poſture, it did run apace at the other new-cut end uppermoſt, ſo as to ſpring and trickle down.

*Note*, That this doth well agree with my Experiments made the laſt year at *Nottingham*, where I obſerv'd wounds of ſome months ſtanding to bleed apace at the breaking up of every hard Froſt. For *firſt*, in theſe parts there hath been no hard Froſt this year, not comparable to the laſt year. *Again*, thoſe *Nottingham*-trees I wounded in the Trunk, and they ſtood againſt a Brick-wall, and the wounds were on the ſide next it; and beſides had Horſe-dung ſtopp'd in all of them for ſome reaſons; which things did undoubtedly defend them much from the Air and Winds, and keep the wounds ſtill green and open: Wheras the tops of theſe *Maple-twiggs*, ſpoken of in the laſt Experiment, were expos'd in an open hedge to the Air and Winds; as alſo the two *Sycamores* here at *York* mention'd in my *former* Letter to have been wounded in *November* laſt, and not to have ſhew'd any ſignes of moiſture, for that very cauſe, that they were not freſh ſtruck at Bleeding times.

Concerning the Bleeding of *Poles* and entire Branches held

held perpendicular, Mr. *Willoughby* is in the right, and ſome Experiments in my laſt to you of *March* 17th confirm it. Yet it is very true what I obſerv'd, though the Cauſe I did not then well take notice of, when I firſt made the Experiment and ſent you an account of it. For, I held the Twigs, which I had cut off, a ſlope, joyning and holding up the cuts together in my left hand, that I might the better obſerve, which part or cut would bleed or not bleed the faſter; and becauſe I found, that the cut of the ſeparated Twig did not in that poſture (holding it upwards, as I ſaid, for the advantage of my eye) bleed at all, when as the Cut of the Branch remaining to the Tree did freely bleed; I therefore inverted the ſeparated Twig and held it perpendicular with the cut end downward, and found, that that little they were expos'd to the Air in an upright poſture, had ſo very much check'd the motion of the Sap, that I concluded they would not bleed at all; and yet ſtriking off their tops, and making Poles of them, I found ſome of them, if not all, that I chanc'd to try, as I remember, would ſhew moiſture: But I am convinced ſince, that it was was rather ſome unheeded accident, as violently bending them, or perhaps the warmth of my hand and ſeaſon, or place, which cauſed this new motiom of Sap, than meerly the ſtriking off their Tops.

*Some Obſervations, touching* Colours, *in order to the Increaſe of* Dyes, *and the* Fixation *of Colours* 15. 1670.

TWo things, I conceive, are chiefly aimed at in the Inquiry of *Colours*, which ſubject you deſire my thoughs of; the *one*, to increaſe the *Materia Tinctoria*, and the *other*, to *fix*, if poſſible, thoſe colours we either have already, or ſhall hereafter diſcover for uſe. As to the *firſt*, Animals and Vegetables, beſides other Natural Bodies, may abundantly furniſh us. And in both theſe

kinds *some* Colours are *Apparent*, as the various colours of Flowers, and the juices of fruits, &c. and the *tinctes* of Animals: *others* are Latent, and discovered to us by the effects, the several Family's of Salt and other things may have upon them, Concerning the *Apparent* colours of Vegetables and Animals, and the various effects, of different Salts in changing them from one colour to another; we have many Instance in Mr. *Boyle*. And if we might, with the good leave of that Honourable and Learned person, range them after our fashion, we should give you at least a new Prospect of them, and observe to you the conformity and agreement of the effects of Salt on the divers parts of Vegetables: *Viz.* 1. That *Acid* Salts *advance* the colours of Flowers and Berries, that is, according to the Experiments of Mr. *Boyle*, they make the infusions of *Balaustium* or Pomgranat-Flowers, Red-roses, Clove-jilly flowers, Meserion, Pease-bloom, Violets, Cyanus flowers, of a fairer red; also the the juices of the Berries of *Ligustrum*, of black Cherris, Buck-thorn-berries, of a much fairer red: and to the same purpose Acid Salts make no great alterations upon the white flowers of Jasmin and Snow-drops. 2. That *Urinous* Salts, and *Alcaly's*, on the contrary, quite alter and change the Colours of the same flowers now named, and juices of the said Berries also, from red to green; even Jasmin and Snow-drops. 3. Again, that in like manner *Urinous* Spirits and *Alcaly's* advance, at least do not quite spoyle the colours of the juices of leaves of Vegetables, of their Wood and Root. Thus Mr. *Boyle* tells us, that *Urinous* Spirits and *Alcaly's* make the yellow infusions of *Madder-roots* red; of *Brazil-wood*, purplish; of *Lignum Nephriticum*, blew; the red infusion of *Leg-wood*, purple; of the Leaves of *Sena*, red. 4. That on the contrary, *Acid* Salts quite alter and change the said infusions from red or blew, to yellow.

In the next place we would note to you the effects of

Salts

Salts upon *Animals* in the production and Change of colours; but the Instances are very few or none, that I meet with in any Author; the *Purple-fish* being quite out of use, and *Cochineil* and *Kermes* are by most questioned, whether they are Animals or no; but I think, we may confidently believe them both to be *Insects*, that is, Worms or *Chrysalys's* of respective Fly's *in proxima fœtura*. We find then, and have tried concerning *Cochineil* (which of it self is red,) that upon the affusion of most the Oyl of Vitriol, that is, an *Acid* Salt, it striks the vivid *crimson* that can be imagined; and with *Urinous* Salts and *Alcaly's* it will be again changed into an obscure colour 'twixt a violet and a violet and a purple. *Pliny* somewhere tells us, that the *Gaules* in his time could dye with Vegetables, what the Romans with so much danger and pains sought for in the bottom of the Sea. Indeed, we find many Plants mentioned by the same Author, for dying which either are not known to us at this present, or neglected.

To what we have briefly observed out of Authors, we will subjoyne some of our own Considerations and Tryals, And *first*, concerning the *Apparent* Colours in Flowers, we think we may insert; 1. That generally all Red, Blew and White flowers are immediately, upon the affusion of an *Alcaly*, changed into a Green colour, and then, in process of no long time, turned Yellow. 2. That all the parts of Vegetables, which are green, will in like manner strike a Yellow with an *Alcaly*. 3. That what Flowers are already yellow, are not much changed, if at all, by an *Alcaly* or *Urinous* Spirit. 4. The Blew seed-husks of *Glastum Sylvestre* old-gathered and dry, diluted with water, stain a Blew, which upon the affusion of Lye striks a Green, which Green or Blew being touched with the Oyl of Vitriol dyes Purple; all these three colours stand. 5. On the tops of *Fungus tubulosus*, so called by M. *Wray* in his late Catalogue of

the Plants of *England*, are certain red knots; these, upon the affusion of Lye, will strike a Purple, and stand.

As for the *Latent* Colours in Vegetables and Animals; to be discovered to us by the affusion of Salts; they likewise, no doubt, are very many. We will set down only a few instances in both kinds, which have not been, that we know of, discovered or taken notice of by others. *Latent Vegitable* colours, 1. The Milky juice of *Lactuca Sylvestris costâ spinosâ*, and *Sonchus asper & lævis* upon the affusion of Lye, will strike a vivid flame-colour or Crimson, and after some time quite degenerate into a dirty yellow. 2. The Milk of *Catapuția minor*, upon the affusion of Lye, especially if it be drawn with a knife, and hath any time stood upon the blade of it, will strike a Purple or Bloud-red colour, and by and by change into an ignoble yellow. *Latent Animal* dyes, 1. The common Hawthorn-Catter-pillar will strike a Purple or Carnation with Lye, and stand. 2. The heads of Beetles and Pismires, &c. will with Lye strike the same Carnation-colour, and stand. 3. The Amber-coloured *Scolopendra* will give with lye a most beautiful and pleasant *Azure* or *Amethystine*, and stand.

*Lastly*, we might consider the *Fixing* of colours for use; but we are willing to leave this to more experienced persons, as also the Philosophizing on the particulars we have produced, to better Heads. Some obvious Inferences we may venture to take notice of; 1. That in all the Instances above mentioned, whether Vegetable or Animal, there is not one colour *truly* fixed, however there may, I conceive, be some use made of them, as they are. I say, *truly fixed*, that is, proof of Salt and Fire; for, what seem to *stand* and be *Lye-proofe*, are either wholly destroyed by a different Salt, or changed into a much different colour; which must needs prove a stain and blemish, when it shall happen in the use of any of them. 2. That both the apparent

and latent colours of Vegetables are *fixable*. An instance whereof we may observe in the seed-husks of *Glastum*, and the Use Diers make of the leaves after due preparation. 3. It is probable from the same instance, that we may learn from the colour of some part of the Fruit or Seed, what colour the Leaves of any Vegetable and the whole Plant might be made to yeild for our use. 4. That the *Latent* colours are praeexistent, and not produced; from the same instance of *Woad*, and likewise from this that the *Milky* juyce of *Lactuca Silvestris* doth afford it self a *Red* Serum. 5. That the change of colours in Flowers is gradual and constant. 6. That the colours of Flowers, which will not stand with Lye, seem to be wholly destroyed by it, and irrecovrable: Thus it happens in the Experiment; that one part of a Violet-leaf, upon the affusion of Lye, is changed very soon into yellow, and will never be revived into a red by an Acid salt; but if another part of the same leaf be still green, it will be revived. 7. That the Dryness seems to be a means, if not of *fixing*, yet bringing the Vegetable colour into a condition of not wholly and suddainly perishing by the otherwise destroying *Alcaly*. 8. That those Plants or Animals that will strike different and yet vivid colours upon the affusion of different Salts, and stand, as the *Cochinel* and *Glastum*, are probably of all others to be reckoned as the best Materials.

It would have been a much safer way, to have put these Inferences in the *Queries*; but besides that I affirm no more but matter of fact, it is lawful for our encouragement (as my Lord *Bacon* advises) to set up rests by the way, and refresh our selves with looking back, though perhaps we have not much advanced. You will be pleased to excuse the little coherence that I have used in these notes, and attribute it to the readiness and affection I have to answer such inquiries as you put to me.

I never yet did make this ſubject any part of my buſineſs, but the deſire I have to ſearch after and examine the Medicinal qualities of things in Nature, hath by the by preſented me with ſuch *Phænomena*, as I was not willing to leave unnoted, nor to refuſe them you, though in a confuſed way, becauſe you deſire them. To conclude, how immethodical and barren theſe papers may ſeem; yet the conſideration of them hath led me to a way of *Fixing* colours, which I willingly forbear to relate, until I may have an oppertunity of ſhewing the Experiment before the R. *Society*. I have found out a Colour moſt exquiſitely black, & comparable to the beſt ink; even in the uſe of the pen, and which will not change by Fire or Salt. This an *Engliſh* Vegetable yielded me, and for ought I know (for I have not repeated the trial on any thing elſe) the like method will ſucceed to good purpoſe. I am, *&c.*

*An Obſervation concerning certain Inſect huſks of the* Kermes-*kind May* 22. 1671. *Philoſophical Tranſactions.* N. 71.

I Gave you a ſhort account formerly * of certain *matrices* or Inſect-huſks, of the *Kermes*-kind, which I had ſome years ſince obſerv'd on Plum-trees. This inſtant *May* hath afforded me the ſame Obſervation, and ſome little improvement of it. I have obſerved the ſame *Patellæ* huſks indifferently on *Vine-branches*, *Cherry-Laurel*, *Plumb-trees*, and the *Cherry-tree*, alſo on the *Apricock-tree*. The *Figure* of the Huſk is round, ſave where they cleave to the branch; for *bignes*,

* *March* 17. 1671. I find in my *Notes* (ſaith he) that ſome years ago I gather'd off our Engliſh Oak round Worm-huſks very like *Kermes*-berries, but I then made no tryal of them. Again, I have often obſerved on *Plumb trees* and *Cherry-trees*; alſo on the *Vine* and *Cherry-Laurel* certain *patellæ* or flat Huſks containing worms, which (or at leaſt the huſks; for them only I had oppertunity of making the Experiment on) will ſtrike a Carnation Ly and ſtand.

I ſome

ſomewhat more than the half of a grey pea. Theſe, I ſay, cleave to their branches, as *Patellæ* do to the Rocks: For *colour*; they are of a very dark Cheſ-nut, extreamly ſmooth, and ſhining membran-like. They adhere moſt commonly to the under ſide of a branch or twig, and ſo are beſt ſecur'd againſt the injuries of weather, as too much Sun and Rain. They are well faſtned to the branches ſingle, and ſome will be double and ſometimes many in company. They are ſeldom found without vermin, as Piſmires, &c. which, I gueſs, pierce them and pray upon them. Thus much for the entire *Coccum*. If you open one of them, that is, cut off dextrouſly the top of the husk with a raſor, you'l find ſomtimes five or more ſmall white magots of the Waſp or Bee-kind, that is, ſharp at both ends. When theſe are carefully taken out, you will further obſerve the remainder of their proviſion of meat, and a partion 'twixt them and the branch, where, what they excerne, is reſerv'd. Laſtly, if, when you have clear'd the Husk of Maggots, Bee-meat, and excrements, you then rub the inſide of the empty membran upon white paper it will freely and copiouſly tinge the paper with a beautiful purple or murrey. At the *date* of this, none of the Maggots were yet in *nympha*, ſo that you cannot expect from me a deſcription of the Bee or Waſp they will turn to, when they come to perfection. Before the ſeaſon be over, the Curious may ſatisfie themſelves forthwith about it, and verifie and improve it. Few *Cherry-trees*, I ſuppoſe, in any place, but will yield them ſome of theſe Berries. However, if they ſhall not be ſo fortunate as to light on them, I ſhall furniſh you with them, &c.

York. *Jan.* 10. 1670. *a Viviparous* Fly. *Inquiries and a Table about* Spiders. *Philoſophical Tranſactions*. N. 72.

Sir,

I Return you thanks for your obliging Letter of the third of *January*, and have ſent you the *Viviparous Fly*

and the Sett of Inquiries you desire of me. The *Fly* is one, if not the very biggest, of the harmless Tribe that I have met with in *England*; I call them *harmless*; because that they are without that hard Tongue or Sting in the mouth, with which the *Oestrum*-kind, or Gad-flyes, trouble and offend both man and beasts. This Fly is striped upon the shoulders grey and black, and as it were checkered on the tail with the same two colours: the *Female* may be known by a redness on the very point of the tail. The very latter end of *May* 1666, I opened several of them, and found two Baggs of live white worms of a long and round shape, with black heads; they moved both in my hand and in the unopened Vesicles, backwards and forwards, as being all disposed in the Cells, length-ways the body of the femal, like a Sheaf of arrows.

Some such thing is hinted by *Aldrovandus* lib. 1. de *Insect.* p. 57. *edit. Bonon. Tiro cùm essem* (saies he) *è grandioribus muscis unam albis pictam lineis, specie illectus, cepi eam, in vola manu aliquandiu retentam, plusculos edidit Vermiculos candidos, mobilitate propria insignes.*

This is the only Fly I have observed with live and moving worms in the belly of it; yet I guess, we may venture to suspect all of this Tribe to be in some measure Viviparous.

With these Flyes I have sent you a paper of those odd turned Snails *, mentioned in my former Letter, which perhaps you may think will deserve a place in the Repository amongst the rarities of the R. Society.

* See Numb. 50. 1011.

*Some general Enquiries concerning Spiders*

1. WHat sorts of Spiders to be found with us in *England*, and what is the best method to distinguish them and to reduce them to *Classes*?

2. Wch-

2. Whether Spiders come not of Spiders, that is, of creatures of their own kind? And whether of Spiders are bred Grashopper, *Cicada*, &c. as *Interpreters* sadly make *Aristotle* to say, first *Aldrovandus*, and lately *Kircher* (V. *Arist. Hist. Nat.* lib. 1. cap. 19. Confer Interpret. *The*: *Gaza*, *Scaliger*, *Aldrov.*)

3. Whether Spiders are not Male and Female; and whether Female Spiders growing bigger than the Male, be sufficient to distinguish Sexes.

4. Whether all kinds of Spiders be alike, as to the place and number of *Penis*'s; and whether all the thread-yeilding kinds, are not furnished with a double *penis*, that is, if the *Cornicula* or certain knobbed Horns, by which all Males are best distinguished, be not each a *penis*, and used in the *Coit* alternatively?

5. Whether the Eggs in Spiders be not formed, and very large before the time of the *Coit*?

6. What Spiders breed in Spring, and what in Autumn? what Spiders are content with one brood in the year, and to lay all their Eggs at a time? What seem to breed every Summer month, at least to have many subordinate broods; and whether the Eggs be accordingly distinguishable in several *Matrices* or Cells in the body of of the Female.

7. Whether Spiders do not take their form and perfection in the Egg, and are not thence hatched necessarily at a stated and set time, that is, after a certain number of days, as 21, compleat Animals of its own kind? and whether the presence of the Female be necessary in order to the hatching the Eggs, at least for three days, as the Ancients seem to affirm?

8. Whether the perfectly-round eggs of Spiders ought to be called and esteemed Worms, as *Aristotle* and *Pliny* will have them, that is, in *Swammerdam*'s phrase and doctrine, Whether they be *Puppets* in the egg, and undergo all alterations accordingly, before they be thence hatched perfect Spiders?

*Hist. Nat.* lib. 3. c. 27. lib. 3. c. 9.

9. What different colours obſervable in the Eggs of Spiders, as well of pulps as ſhell, as white, yellow, orange, purple, greeniſh? and what reſpective tinctures they will give, or be made to ſtrike with the ſeveral families of Salts?

10. Whether there be not Eggs of ſome ſorts of Spiders, which the Worms of certain ſlender Waſps (the kind in general being called by *Mouffet Muſcæ tripiles*) delight to feed on? and whether the Fable of *Veſpæ Ichneumones*, told us by the Ancients, be not to be made out by the ſame Obſervation, of theſe Waſp-worms feeding on the Eggs, and perfected into Waſps in the very webs of Spiders?

*Ariſt. Hiſt. Nat. lib. 5. cap. 20.*

11. After what manner do Spiders feed; whether in ſucking they devour not alſo part of their prey? How long can they live without food, ſince they ſtore up nothing againſt Winter?

12. Whether Spiders feed only of their own kind of Creatures, as of Inſects, that is, of Elyes, Beetles, Bees, Scolopendræ and even of one another? or whether they kill Snakes too, as the Ancients affirm, for food or delight?

13. Whether ſome of them chooſe not to feed on one ſort of Fly or other Inſect only; and what properties ſuch have?

14. When, and how oft in the year they caſt their Skins, and the manner of their caſting it? What variety of colours immediatly after the ſhifting the Hackle in one and the ſame ſpecies of Spider, that may, if not well heeded, make the hiſtory of them more confuſed?

15. What mean the Ancients by Spiders caſting their threads, which *Ariſtotle* compares to *Porcupins* darting her quills, or bark-ſtarting from a Tree; and *Democritus* to Animals voiding of Excrements?

*Ariſt. Hiſt. Nat. lib. 9. cap. 39.*

16. Whe-

16. Whether the thread be formed in the Body of the Animal ſuch as it comes from it; I mean, whether it be, as it were, unwound of a ſtock or clew, as I may ſay, and which indeed to me ſeems to have been *Ariſtotles* meaning; or whether it be drawn off of a liquid maſs, as in ſpinning of Glaſs or melted Wax, which ſeems to have been *Democritus*'s ſenſe, in ſaying it was excrement corrupted or fluid at certain times?

17. Whether the Spiders-thred being glutinous, every thing ſticking to it upon the lighteſt touch, be not ſo much the reaſon of the Spiders taking his prey, as the Figure of the Net.

18. Whether a Web be not uninflammable; and whether it can be diſſolved, and in what Menſtruum?

19. What difference 'twixt the thred of Spiders, and that of the Silk-worm or Caterpillars? What ſtrength a Spiders thread is of, and what proportion it bears with the like twiſt of Silk? Whether there be not ſtronger thread from ſome ſort of Spiders than from others, as there are threds from them of very different colours, as white, greeniſh, blewiſh, dark hair-colour, *&c.* Whether the ſtrength of the *Barmudo* nets to hold a Thruſh, mentioned in one of the *Tranſactions*, conſiſt in the thickneſs only, or much too in the nature of thred?

Nu. 50. p. 795.

20. Whether its being to be eaſily drawn out at any time and at what length one pleaſes, and many threds together in ſpight of the Animal, be not as advantageous to the working of it up and twiſting, *&c.* as the unravelling the Cods of Silk-worms.

21. Whether either the viſcous ſubſtance of their Bodies or Webs be healing to green-wounds, *&c.* as the Ancients have taught us, and we uſe vulgarly? and whether ſome one kind of them be not preferable, for this purpoſe, before others?

22. What uſe may be made of thoſe Animals, which

devour Spiders for their daily food, as *Wrens*, *Red-breast*, &c. ? Whether Spiders be a cure for sick Poultry, as the good Wives seem to experiment ?

23. Whether the reason why Spiders sail not in the air until Autumn, be not because they are busily employed the Summer months in breeding, or what other reasons may be assigned ?

The first article of Enquiry I have in part answered, by sending you enclosed a Scheme, which, after some years observation, I have corrected and enlarged to what it is: yet I must acquaint you, that such Draughts will be ever lyable to change and improvement, according to the measure of knowledge a continued Observation may bring us to. However it is the first, that I know of, that will be extant, on this subject, and it may be acceptable to the curious.

---

Tabulæ

## *Araneorum Angliæ Tabula.*

Aranei
- Aucupes à me dicti; qui scilicet Muscas capiendi causâ texunt
  - Octonoculi
    - Reticulæ
      - Scutulata Antiquis dicta; scil. universis maculis in eodem plano dispositis in modum cujusdam Scuti sive Orbitæ. *Numero* X.
      - Conglobata; scil. maculis crebris in omnes in circuitu dimensiones procedentibus. *Num.* VI.
    - Telas linteoformes; scil. reticulorum filis densè inter se contextis in modum Veli sive Panniculi. *Num.* VIII.
  - Venatorii, qui aperto marte muscas infectantur; cùm tamen alias texere possint; nimirum telas ad nidificationem & ad hybernia.
    - Lupi propriè sic dicti. *Num.* IV.
    - Cancriformes. *Num.* II.
    - Phalangia, sive Aranei pulices assultim ingredientes. *Num.* IV.
  - Binoculi, ferè longipedes, Opiliones quibusdam dicti, telis digitatis sive forcipatis, cancrorum narinorum more armati. *Numero* IV.

*May* 30. 1671; *concerning an Insect feeding upon* Henbain, *together with the colour yeilded by the Eggs of the same, &c.*

Sir,

YOu may please to annex a late Observation to the last I sent you: both being chiefly concerning the improvement of colours, and from the Insect-kind.

There is a *Cimex* of the largest size, of a red colour spotted black, and which is to be found very frequently and plentifully, at least in its season, upon *Henbain*: I therefore in my private notes have formerly intitled it, *Cimex ruber maculis nigris distinctus super folia Hyoscyami frequens.* This Insect in all probability doth feed upon this plant (on which only we have yet observed it) if not upon the leaves by striking its trunk (the note of distinction of the kind of Insect from the rest of the Beetle-kinds) into them, and sucking thence much of its substance, like as other sorts of *Cimices* will upon the body of man *&c*; yet upon the unctuous and greasy matter, with which the leaves seem to touch to abound. It is further observable, that that horrid and strong smell, with which the leaves of this plant do affect our nostrils, is very much qualified in this Insect, and in some measure Aromatick and agreeable, and therefore we may expect, that that dreadful *Narcotis* so eminent in this plant, may likewise be usefully tempered in this Insect; which we refer to tryal. About the latter end of *May* and sooner, you may find adhering to the upper side of the leaves of this plant, certain oblong Orange-coloured Eggs, which are the Eggs of this Insect.

Note 1. that these Eggs yet in the belly of the Females are white, and are so somtime after they are layd; but as the young ones grow near their time of their being hatched, they acquire a deeper colour, and are hatched *Cimices*, and not in the disguise of worms.

2. As to the colour, these riper Eggs yeild, if they be crushed upon white paper, they stain it of themselves

(with

(without any addition of Salt,) with as lively a Vermilion or *couler de feu*, as any thing I know in nature; *Cochneil* scarce excepted when assisted with oyl of Vitriol. Whether this be not precisely so, I refer to the tryal and judgment of the Curious. I have sent you a couple of the *Cimices* themselves, though you will scarce find a Henbain-plant without them. I add concerning the *Purple-husks*, whereof I gave you an account in my last, that I have found them since on Rose-tree-twiggs also, and that very dark coloured ones, yeilding an exquisit Murrey: so that I conclude, that the Tree they may be found on, scarce contributes any thing to the colour or vertue of the husks, but they are the sole work and product of the Mother-Insect, indifferently choosing a twig of any tree in order to the convenient placing and hiving her Eggs.

*Two Letters Of* June 14. 1671 *and* July 5, 1671. *concerning the kind of Insect, hatched of the English* Kermes.

THe *first* Letter. *June* 10th, I found several of the *Patellæ Kermi formes* hatched in a Box, where I had purposely put them. They prove a sort, as I guessed by the figure of the Worm, of Bees, but certainly the least, that I ever yet saw of that Tribe as not much exceeding in their whole bulk the half of a Pismire. They are very compact and thick for the bigness, of a cole-black colour. They seem to want neither stings, nor the three balls in a triangle in their fore-head; which yet are things to be referred to the testimony of a Microscope. That which is very remarkable to the naked Eye, is a white or straw-colour large and round spot on the back: Of their four Wings the upper pair are shaded or darked-spotted, the undermost pair are clear.

We may entitle them, according to our cuſtom, *Apiculæ nigræ, maculâ ſuper humeros ſub-ſtrictâ ſcente inſignitæ, è patellis ſive ſaccis membranaceis, veri Kermes ſimilibus, ſuâque itidem purpurâ tingentibus, Ceraſi aut Roſæ aliarumve arborum virgis adtextis, excluſæ.*

This of the Purple-Husks, and the other Hiſtory of Scarlet-ſtaining Eggs * I preſent you as parallels of our Engliſh ſtore to *Kermes* and *Cochenil*; I mean, additaments to encreaſe the number of agreeable tinging Materials and not Medicaments, unleſs wary and ſafe Tryal ſhall diſcover to us if they have any Medicinal qualities, as ule and cuſtom hath made us believe the Exotic have in an high degree. One of the husks, I ſent you, ad hered to a Roſe-tree-twig, and other to a Cherry-tree. But a Roſe-buſh ſince hath afforded me ſome ſcores of theſe *patellæ*, many of which are hatched in the box I put them. It is to be further obſerved, 1. that thoſe that look the blackeſt, yield the deepeſt and beſt purple: 2. That as the Bees come to maturity the dye ſeems to be ſpent, and the Husks grow dry. 3. That the young ones make their way out at ſeveral ſmall holes; whereas the true *Kermes*-husk ſeems to be pierced but in one place.

* Of which latter See *Numb.* 72. p. 2176. 2177.

The *ſecond*; The diſcovery of our *Engliſh Kermes* hath very much pleaſed ſome of it the Curious in theſe parts; who reſolve upon Tryals of it the next ſeaſon. I think I advertiſed you formerly, that that deep purple or violet, with which the inſides of the husks are lin'd, is much ſpent, if the husks be not taken whileſt the Bees are in *vermiculo*; and the blackeſt husks are richeſt in colour. Yeſterday in very good company we compar'd our Engliſh *Purple kermes* with the *Scarlet-kermes* or Grains of the Shops, and found them in every point to agree ſave in the colour of their Juices; and particularly (finding in ſome parcels of the Shops many

yet

yet sticking to little twigs of the *Ilex*,) we confidently affirm that those as well as ours are only contiguous to the Ilex-branches, and are not *excrescencies* of the Tree, much less *fruit* or *berries*; by which abusive names they have been too long known; But that they are the artifice and sole work of the mother-Bee in order to the more convenient hiving and nourishment of her young.

*Concerning* Vegetable Excrescencies, July 17. 1671. *from* York. *N.* 75. *P. T.*

I Understand by yours of the 13*th* instant, that M. *Ray* cannot without much trouble retrieve the Letter, wherein I gave him formerly my opinion concerning *Vegetable Excrescencies*; and yet not wholly to deny you the satisfaction of what you seem much to desire, I am willing to think again upon the same subject, at least to recollect part of my former thoughts, as my memory will serve me.

The occasion then of that Letter was upon the account given us by You in *Numb.* 57, of the opinion of the Italian *F. Redi*; *Viz.* that some live Plants or their Excrescencies do truly generate some Insects. To which opinion of *F. Redi* I told my friend, as I remember, that I indeed had observed, that the By-fruits of some Vegetables, as of the *Oak* and *wild Rose*, for example, did grow up together with their respective worms in them from small beginnings to fair and large fruit, some of them emulating even the genuin off-spring of the plant,

——*& miretur non sua poma,*

And further, that I did believe, the worms were furnished with food in and from them; but not by any Navil-connexion, as that Author fancies, and which I said, to me was unintelligible, and that I should be glad of a no-

tion, which might make out to me such monstrous relation, as half animal half vegetable, or which is all one, Vegetable vessels inserted into an animal, or, the contrary. Strange Oeconomy!

That it had never been my good fortune (what ever diligence I had used) to discern Eggs in the Center of *Galls*, but a worm constantly, even at the very first appearance, as near at least as my fortune led me. Yet I would not deny, but that diligence might one day discover the egg it self, which I was of opinion was affixed to or near the place by the parent-Insect, where the Gall rose.

That I ever found the worms in all the excrescencies, that I had yet met with, perfectly at liberty; and for the filaments, our Author mentions, it was very possible he might be mistaken, it being very hard, and a matter not yet treated of in my publick paper, which and what are the vessels that enter into the Texture of a Vegetable, as of a large Tree, for example; much more hard would it be to say, this is a vessel in a small Gall. That there were many By-fruits of different figure and shape (though perhaps of a like Texture) upon one and the same plant, every one of which did nourish and produce a different race of Insects: Whence, I told him, I thought might rather be argued the diverse workmanship of different Insects, then one and the same principle of vegetation to be Author of several sorts of Animals.

That the Animals themselves, produced of such Excrescencies, were of such a Genus many of whose Species were well known to us to be otherwise generated of animal parents, and therefore it was probable, that these were so too, as well as their tribe-fellows.

That the Insect-Animals produced of such Excrescencies were *Male* and *Female*; and that, if so, we might argue with *Aristotle* (lib. 1. c. 1. *de Generat. Animal.*) that Nature made not such in vain, and that, if from

the coit of these Animals, which have their birth from no Animals, Animals should be born, they would *either* be like their parents and of the same species with them, and if so, it would necessarily follow (since in the generation of all other creatures it so comes to pass) that their very parents had such origin too: *or* unlike them, and if so (if these also were *Male* and *Female*) of this second unlike off-spring a third race of different animals or *species* would be begot, and of them a fourth, and so *in infinitum*. And that these Insects, which he and I had observed to be produced of the Excrescencies of some vegetables, we had good cause to suspect they were *male* and *female*, since some of them had stings and were tripilous, and others not (*vide Catalog. plant. Cantab. ad Rosam caninam & alibi.*)

These were some at least of the Arguments, as far as I remember I used, when I formerly wrote on this subject to my friend; but since that Letter, I have perused the Book of *F. Redi* it self, and do find, that the said opinion is barely proposed as thing not unplausible, but the proofs thereof are reserved, till the publishing of a curious piece, concerning the *Excrescencies* of the *Oak*; and therefore I shall be less earnest in the refutation of that opinion, which perhaps a more accurate search into Nature will in time make the Author of it himself find erroneous.

I presume not to venture to decide this controversy, my experience in these matters being too insufficient, and my leisure and health but little to hasten a convenient stock of particulars, and a due examination of them; yet before I leave this subject, I am willing to run over and present you with a few abreviated instances of some of the several kinds of Vegetable Excrescencies, and likewise some un-obvious ways of Insects feeding on plants; and these I shall deliver in confirmation of the following Propositions.

1. That all are not truly Vegetable Excreſcencies that are reputed ſuch. And here we may juſtly name the *Purple-Kermes*, for example, whoſe hiſtory you were pleaſed to publiſh in *Numb.* 73. This, I ſay, both gives a clear light to the diſcovery of the nature of the *Scarlet-Kermes*, (a thing wholly unknown to the Ancients, as far as we can ſee by their writings, and no leſs ignored by the moderns, and yet, which is admirable, in very great eſteem and continued uſe for ſome thouſands of years,) and alſo is an evident inſtance, that ſome things, confidently believed Vegetable Excreſcencies, are no ſuch matter, but Artificial things meerly contiguous to the plant, and which have no other relation to it than the *patella*-ſhellfiſh to the Rock it cleaves.

2. Generally, Inſects Eggs laid upon the leaves of plants, or their reſpective feeding on them do not occaſion or raiſe Excreſcenies. This truth every body, that hath been the leaſt curious, is an Eye-witneſs of. Thus, for example, the Eggs of the common *Red butter-fly*, laid upon the Nettle, are thereon hatched without bliſtering the plant into an Excreſcence, and the ſtiff haired or prickly *Catterpillars* hatched from them Eggs, feed upon the leaves without any ill impreſſion, puncture, or prejudice, ſave that they make clean work, and eat all before them. I could produce ſome hundreds of inſtances, if this were to be doubted of.

3. Some Inſect-eggs, laid upon the leaves or other parts of plants, do, as ſoon as hatched, pierce and enter within the plant to feed. To give you a convincing inſtance of the truth of this propoſition, take this from my notes.

*May* 22, I obſerved on the back or underſide of the leaves of *Atriplex olida*, certain ſmall milk-white oblong Eggs, on ſome leaves four, on others fewer, or more; theſe Eggs were on ſome plants yet unhatched, but on many of the ſame plants I found the Egg-ſhells

or

or skins yet adhering to the leaves, and the little maggots already entered (through I know not what invisible holes) within the two membranes of the leaf, and feeding on the inward pulp or substance of the leaf: in other leaves of that plant, (he that shall make the observation after me, will find plants enough of this *species* seized on, to vary, as I did, the observation in one day,) I found those maggots grown very great, and yet the two membranes, that is, the uppermost and undermost skin of the leaf, entire, but raised and hollow like a blather. Note 1. That those maggots were of a Conick shape. 2. That in *July* they shrunk into *Fly Chrysalis*'s and accordingly came to perfection, &c. To this unobvious way of feeding we may refer all worm-eaten fruits, wood, &c.

4. Worms feeding within some of the parts of some plants do cause Excrescencies. Thus the head or seed-vessels of *Papave. Spont. Sylv. Ger. Emac.* &c. are disfigured for having worms in them, and grow thrice as big, as the not seased ones. This is also plain in the Excresc. of *Pseudo tricrium*, and *Barbarea*, &c.

5. The substance or fibrous part of many Vegetable Excrescencies is not the food of the worms to be found in them. The instances given in confirmation of the last proposition do also confirm this: neither is an *Oak-apple* properly worm-eaten, or the *Shagged Galls*, or *Sponges* of the *Wild Rose*, or the *Smooth* ones on the leaves of the same plant, or the Baggs upon the leaves of the *yellow dwarf Willow* or the *Elm*, &c.

This is the sum of what I to say at present concerning this subject being very unwilling to advance further, than my own private observations will suffer me.

*York.*

*York* August 25 1671. *confirming the Observation in* N. 74. P. L. *about Musk scented Insects; adding some Notes upon* D. Swammedam's *book of Insects, and on that of* M. Steno *concerning Petrify'd Shells.*

SIR.

I Have observed the two Insects, which Mr. *Ray* saith, smell of Musk, which indeed they do in an high degree. The *small Bees* are very frequent in the Wooles in *Lincoln-shire*, and about the latter end of *April* are to be found in pastures and meadows, upon the early-blown flowers of a sort of *Ranunculus*, as You have been rightly inform'd; but it is something improper to say Bees feed on flowers: And likewise the same Bees are no less frequent on the flowers of *Dens Leonis*, &c. The *sweet Beetle*, is a very large Insect, and well known about *Cambridge*. All the trials I have made to preserve them with their smell, have proved ineffectual: For, both sorts of these Insects will of themselves in very few weeks become almost quite scent-less. To these I shall add another sweet-smelling Insect, which is a Hexapode-worm feeding on *Gallium luteum*.

The Observation of the *Vespæ Ichneumones*, as it hath relation to Spiders, I willingly reserve for other Papers: yet I may tell you in general, that this kind of Insect is one of the greatest puzzels † in nature; there being few Excrescencies of Plants, and very many births of Insects, wherein these slender Wasps after divers strange ways are concerned.

† See more of this in my Notes upon *Goedartius*

Though I be at present from my Books, yet I well remember the passage, which Mr. *Willoughby* refers you to in *Musset* *. And he is well able to judge, whether the Observation be made upon the same sort of Insect. I conceive it a fault not consistent with Ingenious Spirits, to pass by in silence the Industry of Moderns as well as Ancients Writers;

* See Numb. 74. p. 1221.

Writers; according to that of C. *Celsus*: *Oportet neque recentiores viros in his frandare, quæ vel reperunt, vel recte secuti sunt; & tamen ea, quæ ab antiqui-oribus posita sunt, authoribus suis reddere.* You can best inform me, what D. *Swammerdam* does in a matter of this nature: when I read in the Account given us by you of his Book, *Numb.* 64; that Snails are both Male and Female; that Catterpillars may teach us, by their feeding, the correspondence of the vertues of Plants, &c; I am desirous to know, whether he quote Mr. *Ray* for the *former*, as having publish't the Observation ten years ago at least; and for the *latter*, the Learned and Noble *Fab. Columna*, who did propose the way of essaying the vertues of Plants by the palats of Insects in the beginning of this Age.

Coehlitæ, or Petrified shells examined.

But I leave this, and proceed to a remark of my own; and it shall be, if you please, concerning *Petrified Shells*; I mean such Shells, as I have observed in our English stone-Quarries. But Sir, let me premise thus much, that I am confident, that you at least will acquit me, and not believe me one of a litigious nature. This I say in reference to what I have lately read in *Steno's Prodromus*, that, if my sentiments on this particular are somewhat different from his, it proceeds not from a spirit of contradiction, but from a different view of Nature. First then, we will easily believe, that in some Countries, and particularly along the shores of the Mediterranean Sea, there may all manner of Sea shells be found *promiscuously* included in Rocks or Earth, and at good distances too from the Sea. But, for our English-inland *Quarries*, which also abound with infinte number and great varieties of shells, I am apt to think, there is no such matter, as Petrifying of Shells in the business (or, as *Steno* explains himself p. 84. in the English Version, *& alibi*, that the substance of those shells, formerly belonging to animals, hath been dissolved or wasted by the penetrating force of juices, and

and that a ſtony ſubſtance is come in the place thereof,
but that theſe Cockle-like ſtones ever were, as they are
at preſent, *Lapides ſui generis* and never any part of an
Animal. That they are ſo at preſent, is in effect con-
feſſed by *Steno* in the above cited page; and it is moſt
certain, that our Engliſh Quarry-ſhells (to continue that
abuſive name) have no parts of a different Texture from
the rock or quarry they are taken, that is, there is no ſuch
thing as *ſhell* in theſe reſemblances of ſhells, but that Iron-
ſtone Cockles are all Iron ſtone; Lime or marble all
Lime-ſtone and Marble; Sparre or Chryſtalline-ſhells
all Sparr, &c. and that they never were any part of
an Animal. My reaſon is: That Quarries of different ſtone
yeild us quite different ſorts or ſpecies of ſhells, not only
one from another (as thoſe Cockle-ſtones of the Iron-
ſtone Quarries of *Adderton* in *York-ſhire* differ from
thoſe found in the Lead-mines of the neighbouring mo-
untains, and both theſe from that Cockle-Quarrie of *Want-
ford*-bridge in *Northampton-ſhire*, and all three from
thoſe to be found in the Quarries about *Gunnerby* and
*Beavour-Caſtle*, &c;) but, I dare boldly ſay from any
thing in nature beſides, that either the land, ſalt, or freſh
water doth yeild us. 'Tis true, that I have picked out
of that one Quarry of *Wantford* very reſemblances of
*Murices*, *Telinæ*, *Turbines*, *Cochleæ*, &c. and yet I am
not convinced, when I particularly examined ſome of our
Engliſh ſhores for ſhells, alſo the freſh waters and the
fields, that I did ever meet with (N. B.) any one of thoſe
*ſpecies* of ſhells any where elſe, but in their reſpective
Quarries; whence I conclude them *Lapides ſui generis*,
and that they were not caſt in any *Animal-mold*, whoſe
ſpecies or race is yet to be found in being at this day.

This argument perhaps will not ſo readily take place
with thoſe perſons, that think it not worth the while ex-
actly and minutely to diſtinguiſh the ſeveral *ſpecies* of
the things of nature, but are content to acquieſce in

*figure*

*figure, resemblance, kind,* and such general notions; but when they shall please to condescend to needful and accurate descriptions, they will, I doubt not, be of that opinion, which an attentive view of these things led me into some years ago. Though I make no doubt, but the Repository of the *R. Society* is amply furnished with things of this nature; yet if you shall command them, I will send you up two or three sorts of our English Cockle-stone of different Quarries, nearly resembling one the other and all of them very like a common sort of Sea-shell, and yet if there shall not be enough specifically to distinguish them, and hinder them from being sampled by any thing of the spoils of the Sea or fresh waters or the land-Snails; my argument will fail, and I shall be happily convinced of an Errour.

*Another Letter, from* York *Sept.* 13. 1671. *enlarging his former Communications in Numb.* 75. *about* Vegetable Excrescencies, *and* Ichneumon-Wormes.

IN my last Paper about *Vegetable Excrescencies*, I was wholly silent of the opinion, which Mr. *Willoughby* is pleased to favour; and because that worthy Gentleman hath so far made it probable, that now it seems only to depend upon the good fortune of some lucky Observer, I am willing to reassume my former thoughts, that all those odd Observations, we have made of the *Births* of *Ichneumons*, do but beget in me a strong belief, that they have a *way* yet unheeded, whereby they do as boldly, as subtly, convey their Eggs within the Bodies of Insects and parts of Vegetables.

A fifth and last proposition of that Paper * was, that the *substance of many Vegetable Excrescencies seemed not to be the food of the worms to be found in them.* My meaning was, that the substance of the Vegetable Excrescencies in

* See Numb. 75. p. 1234.

which those *Ichneumon* worms were to be found, was rather augmented, than diminished or worm-eaten. And the like conformity of their feeding within Insects is well observed by Mr. *Willoughby* *, that the imprægnated Caterpillars seem not to be concerned, though their bodies are full of Insects of a quite different kind, but go on as far as they may towards the atchievement of the perfection of their own species. Thus I have seen a *Poppy-head* swoln to a monstrous bulk, and yet all the Cells were not receptacles of *Ichneumons*, but some had good and ripe seed in them. I shall not refuse Mr. *Willoughby* (though you know upon what grounds I have twice done it to you) the satisfaction of an Answer to my 10*th* *Quære*, by him resolved negatively: It is true, the swarms of the *Ichneumons*, coming out of the sides of Caterpillars, do immediatly make themselves up into bunches, and each particular *Theca*, from the Cabbage-Caterpillar (for example,) is wrote about with yellow silk, as those from the black and yellow-*Jacobæa*-Caterpillar with white; but as for web to cover those bunches of *Theca's*, I never observed it but in the green Caterpillar so common in our *Lincoln-shire* heaths, which are affixed to Bents or other plants. These in truth never deceived but my expectation, for I verily thought I had found, when I first observed them, a Caterpillar equivalent to the *Indian* silk-worm; but having cut them in two, and expected to have found a Caterpallars *Chrysalis* in the middle, there presented themselves a swarm of *Ichneumons*. These are as large many of them as my thumb, that is, at least four times bigger then the *Folliculus* or Egg-bag of any English spider that I ever saw yet. By good fortune I have not thrown away the boxes, wherein I made the Observation concerning *Ichneumons* feeding upon the Eggs of certain Spiders. I have had them in several boxes, some 8, some 10, some 12 days in *Vermiculo*

* See above in this very Treat.

*miculo*, feeding upon the very cakes of Spiders-eggs, before they wrought themselves *Thecæ* for further change; and they seldome exceeded the number of 5 to one cake of Eggs, &c. so that you may assure Mr. *Willoughby*, this is no conjecture, but a real observation accompanied with more circumstances, than I am willing at present to relate.

*Some Additions about* Vegetable Excrescencies, *and* Ichneumons Wasps; *together with an Inquiry concerning* Tarantula's, *and a Discovery of another* Musk-scented Insect: *from* York *in two Letters, of Octob.* 16. *and* 28. 1671.

*The Extract of one of these Letters*

THat this Letter may not be all matter of Philosophy, you may take an occasion to put this *Quære* to your correspondents of *Italy*, viz.

Whether the *Tarantula* be not a *Phalangium* (that is, a six-eyed skipping Spider) as *Matthiolus* and others seem to tell us? if so, whether some later Authors impose not on us by giving us a Cutt of the Figure of a Net or *Reticulm orbiculatum*, which our English *Phalangia* are never (that I know of) observed to weave or make use of in hunting? and whether the person bit by a *Tarantula*, be not ever, when on his feet, disposed to and actually dancing after the nature of a *Phalangium*, which seldom or never moves, but by skipping; even as it happens with such that are bitten by a Mad Dog, who have been sometimes observed to bark like a dog, &c. And if so, what we are to think and credit concerning such and such Musical tunes, said to be most agreeable and tending to the Cure of persons bit by a Tarantula?

But next among other things, I had the good fortune to present Mr. *Willoughby* giving me the honour of two

visits, with a *Musk-Ant** an Insect observed by me not many days before his first visit: And though I cannot send you the Insects themselves, as having parted with all I had, yet I will the Note, *viz.*

* See of two or three more Musk-Insects Num. 74. p. 2220. and Numb. 76. p. 2281.

*Septemb.* 2. I found in a Sandy Ditch-bank, the first hollow beyond the Ring-houses in the high-road to *London* about a mile and an half from *York*, a sort of exceeding small *Pismires*) by which note alone I think they may be sufficiently distinguisht from all at least that I have seen.) Those *without* wings were of a light-yellow or flaxen, and being broken at one's nostrils they emitted, like others, an acid or sowre sent; but those of the same bank *with* wings, were cole-black, and these, bruised and smelt to, emitted so fragrant a smell like *musk*, that I must confess they were too strong for me to endure: yet having kept them some time by me, the more delicate sex were not displeased with the smell. And an Apothecary in this City, famous for his diligence in Chymical Operations, did compare them (unseen and not yet made known to him) to an excellent balsom, he is wont to prepare.

Mr. *Willoughby* inform'd me, that he had found the *Goat-chafer* or *Sweet beetle* * out of season as to that smell; and thereupon asked me, what I had observed as to the time of their sweetest and strongest smelling? I answer'd, that I believed it to be at the time of the *Coit*, for asmuch as at that time, when I took them highly perfumed, I had observed the female full of Egg.

* Of which see Numb. 74. p. 2220. and N. 76. p. 2282.

*The Extract of the other Letter:*

—I Send you a second paper about *Vegetable Excrescencies*; the shortness of the former* and some things therein, perhaps liable to Exception, obliging me thereto.

* Of which see Numb. 75. p. 2254.

Con-

Concerning the fifth and last proposition of the *first* paper, it might be more intelligibly expressed thus, *viz.* That the substance or *fibrous* part of *many* Vegetable Excrescencies *seems* not to be the food of the worms found in them: My meaning is, that the worms in those Vegetable Excrescencies, which produce *Ichneumons* (to which kind of Insect we would limit this proposition, and therefore expunge all other instances,) these worms, I say, do not seem to devour the substances or fibrous part of them, as other worms eat the Kernels of nuts, &c. but that (what-ever their manner of feeding is, and we doubt not but that they are nourish't in and upon some part of them,) the Vegetable Excrescencies still mightily increase in bulk, and rise as the worms feed.

It is observable (to endeavour a Solution) that some of the *Ichneumons* delight to feed of a liquid matter, as the Eggs of Spiders, the juices (if not Eggs) within the bodies of Caterpillers and Maggots: Whence we conjecture, that those of the same *Genus*, to be found in Vegetable Excrescencies, may in like manner suck in the juices of the equivalent parts of Vegetables. And *this* the dry and spongy texture of some of those kind of Excrescencies, seems to evince: For, if you cut in pieces a *wild-poppy-head*, for example, (or the great and soft balls of the *Oak*) you'l find in those partitions, wherein these worms are lodged, nothing but a pithy substance like that of young Elder; and if there chance to be any cells yet unseised, (which I have sometimes observed) the seeds therein will be found yet entire and ripe. Whence very probably they feed upon or suck in by little and little the yet liquid pulp of the tender seeds, and leave the substance or fibrous part to be expanded into an Excrescence.

As for matter of Fact, to clear the truth of that opinion, that the divers races of *Ichneumons* are generated by their respective Animal-parents, and particularly that those

which the divers Excrescencies of Vegetables produce, are not *plantigenous*, I am in great hopes, the instance of *Poppy-heads*, swoln into Excrescencies, will favour us the next season. My expectation is chiefly grounded upon the condition and nature of that plant; which is such, that nothing can pierce the skin of it and wound it but it must necessarily leave a mark of its entry, the milky juice springing upon the lightest puncture, and drying and *concreting* suddainly into a red scar: And this, I think, I may affirm, that of the many heads grown into Excrescencies, which I gathered this Summer, all had more or less of those marks upon them. But our aim is heer only to make way for the Observation against the next season; to which purpose also we propose the following *Quære's*;

1. Whether the shagged balls of the *Wild Rose* are not Excrescencies grown from the bud and very fruit of the plant; like as the *Wild-Poppy*-heads are apparently not for worms but seed.

2. Whether the large and soft balls of the Oak are not in like manner the bud and acorn with all the parts of a sprouting branch, thus monstrously perverted from the first design of nature?

3. Upon what parts or juices the *Ichneumons*-wroms, supposed to be thrust into Caterpillars and other Maggots can be thought to feed: And whether there be not actually Eggs in Caterpillars and Maggots (as there are to be observed in their respective *Chrysalis*'s) sufficient to serve them for food?

Concerning the name ἰχνεύμων although I could willingly refer you to Mr. *Ray*, who is another *Hesychius*; yet for present satisfaction I shall transcribe what the Excellent Critique G. *Vossius* saith (c. 16. *de Inimicitia*;) *Ichneumon* (i.e. *Mus Pharaonis sive Ægyptiacus*) *Crocodili & Aspidis ova indagat, unde illi* Ichneumonis *nomen, quasi dicas* Indagatorem (ἰχνεύμονα) *Reperta utriusque*

*ova*

*ova conterit; ut est apud Oppianum in 30 de Venatione: Nicander tamen ait, eum Aspidis ova humi mandare.*

Now a like Observation of certain Insects of the Wasp-kind, made no doubt by some of the Ancients, occasioned the application of that name to *Wasps*, as well as to that *Ægyptian Mouse*. Yet cannot I remember to have met with, in any of the Ancients, of more than one text concerning those Wasps; viz. *Aristot. de Hist. Anim.* 5. c. 20. which *Pliny* (vid. lib. 11. c. 21.) hath rendred in a manner *verbatim*, thus: *Vespæ, quæ Ichneumones vocantur (sunt autem minores quàm aliæ) unum genus ex araneis perimunt, phalangium appellatum, & in nidos suos ferunt; deinde illinunt, & ex iis, incubando, suum genus procreant.*

How far this relation is true, and agreeable to modern Observations, we shall have perhaps occasion to discourse of else-where; Our design here is only to tell you, that we have enough to make us believe, that those very Insects, we have been treating of, are sur kind, the *Ichneumons* of the Antients.

*A Letter.* York, *Januar.* 10. 1671. *containing an account of* Veins *observ'd in* Plants, *analogous to Humain Veins.*

*SIR,*

I Am very much pleased, when you give me to understand, that somthing is published of the *Anatomy* of *Vegetables*, and that more is designed by that excellent person Signior *Malpighi* *. And since the receipt of your last, I have perused the very ingenious Book of Dr. *Grew* and, as far as I have observed these matters, all things therein are faithfully delivered, and with great sagacity. In turning over my Notes, made

* *This Learned and Accurate Philosopher hath already presented to the R. Society, in a very obliging manner, his Manuscript, containing the Sum of his Observations and Labours about the Structure of Plants; and he hath also very generously engaged himself, that, upon the Approbation of that Illustrious Body, he will enlarge his Papers, illustrate all the particulars, therein contained, with Schemes, and them publish the whole.*

made some years agoe, I find among other things of this nature, some few Observations concerning the *Veins* of Plants, or such *Ductus*'s as seem to contain and carry in them the noblest juices of Plants. Of these there is little or no mention made in this curious *Treatise*, unless under the notion of *Pores*. And because I am of the opinion, that they will prove vessels Analogous to our *Humane Veins*, and not meer *Pores*, they shall, if you please, be the subject of your entertainment in this Letter; and the rather that, if they prove *Veins* (as I little doubt them) they are not to be passed over in silence, but are early to be accounted for in the Anatomy of *Vegetables*.

To avoid ambiguity; Those parts of a Plant, which *Pliny* (*lib.* 16. 38.) calls by the names of *Vena* and *Pulpa*, are nothing else, in my opinion but what our late Author, Dr. *Grew*, calls *Fibres* and *Interwoven*, or the *Lignous* body interwoven with that which he takes to be *Cortical*, that is, the several distinctions of the *Grain*. Now, that the vessels, we are about to discourse of, are not any of the *Pores* of the *Lignous* body (to use the *Doctors* terms) is plain in a traverse Cut of *Angelica Sylvestris magna vulgatior* T. 8, for example; the Veins there very clearly shew themselves to an attentive view to be distinct from *Fibres*, observable in the *Parenchyma* of the same Cortical body together with themselves; the Milky juice still rising *besides* and not *in* any *Fibre*. Also in the like cut of a *Burdock* in *June*, the like juice springs on this and on that side of the *radii* of the Woody circle, that is, in the *Cortical* body and *pith* only. Again, where there is no *pith*, there is none of these *Veins* as in the Roots of plants, and Trunks of trees; but ever in the *Bark* of either. I need not here enumerate the many Plants, wherein these particulars are most plainly observable, as in *Sphondylium*, *Cicutaria*, many of the *Thistle* kind, &c.

Further, Neither are they probably of the number of the *Pores*, described by our Author in the *Cortical* body, or

of *Pith*. Not surely of those *Pores* extended by the *breadth*, because the course of the juice in these vessels is by the *length* of the plant; as I have sometimes very plainly traced in the pith of a dryed *Fennel-stalk*, following them by dissection quite through the length of the pith. It remains, that, if *Pores*, they are of those pores of the *Cortical* body, that are supposed to be extended by the *length* thereof; which yet seems (to me at least) not enough, but we think them vessels invested with their own proper membranes, analogous to the Veins of our Humaine bodys for these reasons: 1. Because they are to be found in the *Pith*, and sometime in the *Cortical* body of a plant, not included within the *common* Tunicle of any *Fibres*, as is above noted: (that Fibers, or the Seminal root are cloathed, is most plain in some plants, as in *Fern* and *Geranium Betracboides*, the Fibres of the former are coated, at least in some parts of the plant, with a black skin, in the *latter* likewise with a red one:) And in these cases, had they not, I say, their own proper membranes, we see no cause, why the very porous and spongy body of the *Pith* and *Cortex*, should not be in all places filled alike with the juice, and not rise (as most plainly it doth) in a few determinate and set places only, that is, according to the position and order of these vessels. 2. Again the Experiment I made, which you were pleased to publish*, concerning the effect of a ligature on *Euphorbia minor Lobel.* viz. the sudden springing of the Milky juice out of infinite pores besides the Incision: (the cause of which *Phenomenon* I take be, the dissected veins impetuously discharging themselves of part of their juice within the porous *Parenchyma* of the Bark;) whence it is probable, that, if there was no coated vessel to hold this milky juice, we might well expect its springing upon the bare ligature, as when we squeez a wet Sponge; the external Cuticle of the plant,

* See Numb. 30, p. 2121, & 2143.

as this Experiment shews, being actually perforated.

In the next place it is very probable, that these vessels are in *all* Plants whatsoever. For as it is truth-like of all the other *substantial* parts of plants, though specified by divers accidents in Figure and Texture; so of these *Veins*, which, though they be discernable mostly in those plants where they hold *discoloured juices*, yet we may very probably think, that they are not wanting, where the eye finds not that assistance in the challenging of them. And in these very plants, where they are *least* visible, there is yet a time when they are, if not in all, yet in some parts of these plants, plain enough to the naked eye: The tender shoots of the Greater and Lesser *Maple*, in *May*, are full of a milky juice; *viz.* the known liquor of these Veins. Again to this purpose, If you apply a clean knife blade to a travers cut of the like Shoots of *Elder*, the Gummy liquor of these Veins will be drawn forth into visible strings, as is the nature of Bird-lime of the bark of *Holly*, or the milk of *Catapatia minor Lobel.* Further, The leaf stalks of our *Garden Rubarb* do sometimes shoot (by what accident, we enquire not here) a transparent and very pure Chrystallin *Gumm*, though the Veins, that held this gummy juice, are by no ordinary means visible in them, and yet by comparing the nature and properties of this Gum, with that of the Gums of other Vegetables to be of theirs, by the same comparative Anatomy. Lastly, we think, that even *Mushromes* (that seemingly inferiour and imperfect order of Vegetables) are not exempt and destitute of these Veins, some of them yielding a milky juice, hot and fiery, not unlike some of the *Spurge* kind, or *Euphorbium*.

It might be expected, that I should add somethings at least, concerning the Original and Productions of these Veins, if not an exact description of them, the course of the juices in them, and their more immediate and primary

mary uſes in the matter of Vegetation: But I muſt acquaint you, that (beſides the ſeaſon is not now proper to improve and verifie, if I had leiſure, the Obſervations formerly noted, and that they were things thrown into my *Adverſaria* without other order, than that nothing ſhould ſlip from me in the queſt of Medicaments, that might be of light) although I find indeed many ſcattered particulars (beſides them already delivered) concerning the Poſition, Order, Number, Capacity, Diſtributions, Differences, Figure, &c. of theſe Veins; you will be pleaſed to take it in good part, if I think fitting to reſerve them until the opportunity of another Summers review: It ſeeming to me no ſmall matter, to have fairly hinted the exiſtence of them to ſuch curious perſons as ſhall have the leiſure, and find themſelves in better circumſtances, than I can pretend to, as to thoſe great advantages of Glaſſes. Deſigning, &c.

To conclude with the *primary* uſe of theſe *Veins*; which is, in my opinion, to carry the *Succus nutritius* of *Plants*, becauſe, where they are not, there is no Vegetation; as it is ſeen, if an ingrafted Branch or Arm be bared and ſtripped off the clay, &c. in *June*, all the courſe of Vegetation will appear to have been made only by the *Bark*, and not by the *Wood*, that is, in the place only, where theſe veins are. A *ſecondary* uſe is the rich furniture of our Shops; for, from theſe *Veins* only it is, that all our *Vegetable Drugs* are extracted, and infinite more might be had, by a diligent enquiry, and eaſy means, which I have not unſucceſully put in practice; witneſs the *black Reſin*, I not long ſince ſent you a ſpecimen of.

*An Account of a Stone cut out from under the tongue of a Man; sent in a Letter to his Grace the* Lord Arch-Bishop *of* York.

May it please your Grace,

IN obedience to your Grace's Commands, I have penned the Circumstances of a not common Medical observation, viz. the Excision of *a stone* from under the tongue. And I here with present your Grace also with the stone its self, as I had it from the person it was taken.*

* This Stone is now in the custody of the R. Society, to whom it was presented afterwards.

As to the occasion and time of its birth, he tels me, (My Lord, you may be pleas'd to give firm Credit to every particular, that he hath answered me at your Grace's instance) it was from a winter Sea-voyage, which lasted much longer than he expected, and wherein he suffered an exceeding cold; and that, not long after his landing, he found a certain *Nodus* or hard lump in the very place whence this stone was cut. There was about 8 years betwixt its breading and being taken away.

As to its growth, and the inconveniences thence ensuing; he further saith, that upon all fresh-cold taking, he suffered much pain in that part especially; and yet, that cold once being over, that part was no more painful than the rest of his mouth. He adds, that towards the *7th* and *8th* year it did often cause sudden swellings in all the Glanduls about the mouth and throat upon the first draught of beer at meals; which yet would in a short time fall again.

Lastly, as to the particulars remarkable at the time of its being taken away, he relates; That it began its work with a sudden *vertigo*; which vertiginous disposition continued more or less from Spring 'till *August*; in which month, without any prævious cause save riding, the place where it was lodged suddainly swelled, and

and ran purulent matter at the aperture of the *ductus Whartonianus*: that it suddainly stopped of its running (which he cannot attribute to any thing but Cold,) and swelled with a great inflammation, and very great danger of choaking; it being scarce credible, what pain the party suffered in endeavouring to swallow even beer or any liquid thing.

This extremity lasted 3 days, in all which time, the party had so vast a flux of spittle runing from him, that it was not possible for him to repose his head to sleep, without wetting all the bed about him; insomuch as that it was very much questioned by some friendly visitants, whether he had not of himself, or by mistake, made use of Mercurial medicines.

The varieties or degrees of this *spontaneous salivation* were such, that he urged me not to omit them in the relation I was to make to your Grace, as thinking them very notable.

The first day, the *saliva* ran thin and transparent, almost like water without any bubles. The 2 day it ran frothy; it tasted salt, (which yet he is apt to think hot rather, than really salt, because that day the inflammation was at the height.) The 3 day it roaped exceedingly; on which day a small pin-hole broak directly over the place of the Stone and ran with purulent matter as formerly. The 4 day the *saliva* ran *insipid*, sensibly cold in the mouth; (which again confirms me in that opinion, that the former sharp taste was the effect of heat, and not the immediate quality of a salt humour;) very little frothy. The 5 day (which was that of the incision,) it ran as on the 4 th but left an extream clamines on the teeth, insomuch that they often clave together, as though they had been joyned together with glue.

Upon the incision, which proved not wide enough, the membranes or bagg, wherein the Stone lay, came away

way first. As to the Stone it self, it was so hard as to endure the *forcipes* in drawing it forth: it was covered over with grass green matter, which soon dryed, and left the stone of a whitish colour, as it is to be seen. It is but light in proportion to its bulk, weighing about 7 grains, and its much of the shape of our ordinary horse-beans. There are visible impressions upon it of some Capillary and small vessels, it was bred amongst. Lastly, it is scabrous or rough, sand-like, although the substance is Tophaceous.

The Accidents accompaning the working away of this Stone, (for the incision was meerly obstetrical,) and the place of its birth give occasion to call the distemper a *Ranula*. Yet in truth this was nothing else but one of those Tumours called *Atheroma*, and therefore we will name it *Lapis Atheromatis*.

*An Extract of a Letter from* York *April* 12. 1672. *concerning* animated Horse-haires; *rectifying a Vulgar Error.*

Sir.

I Cannot discover any thing new and rare in natural Philosophy, but I must forthwith make you participate of my good fortune; and I assure you, the relation, I am about to make you, is of a thing very surprising.

It hath been credibly reported, that *Horse-haires* thrown into water will be animated; and yet I shall shew you by an unquestionable observation, that such things as are vulgarly thought animated Hairs are very Insects, nourished within the bodies of other Insects, even as *Ichneumons* are within the bodies of Caterpillars.

I will premise the particulars concerning this Animal, as I find them collected by the Industry of *Aldrovandus*, and save you the trouble of that voluminous Author.

This Insect (saith he) seems to have been unknown to

to the Ancients; as it is called by the moderns *fetæ aquaticæ* or *vermis fetarius*, either from the most slender figure of the body; or because it is thought to be generated of an horse-hair putrifying in water. The Germans call them by a name rendred *Vituli aquatici*.

It is bred in corrupt waters; perhaps of horse-hair, for (saith *Albertus* upon his own frequent trial, as I find him quoted by *Aldrovandus*,) these hairs, put into standing water, move and are animated or, as he words it, *vitam & spiritum accipiunt, & moventur*. Other have thought them to have their birth from weeds hanging down from the banks into ponds and Rivers. Others from Locusts and Grashoppers (*ex Brachu*;) which last though it be near the matter, yet it is rejected by *Aldrovandus* himself, as the most unlikely.

They have been found in cold and good springs, and elsewhere, (which is a wonder, saith *Aldrovandus*,) upon a leafe in a Garden. And one, which was there found, was 5 or 6 fingers-breadth long; the thickness of a bristle Horse-hair, with a dusky back, and a white belly; and the tail on every side white.

I saw (saith *Aldrovandus*) a black one thicker than the whitish one. Other Authors otherwise describe them, as *Bertinus, Albertus, &c.* Some affirming them to have been a cubit long; others, two cubits; others, 9 inches long at the least: that they are white of colour, and so hard as scarce to be crushed with ones foot: to be every where of the same thickness: that they move not as wormes move, but *snake-like*, and knit themselves up into knots: that their skin is one continued thing without Insisures; and therefore some would exclude them from the Insect-kind: that they have no head, but swim both wayes, and therefore may be called *amphibæna aquatica*: that they are poyson, drunk down into the stomach, but not venom to touch.

And thus much out of *Aldrovandus* concerning the

name of this Insect, the place of its birth and original, the place where they are to be found, its description, different species, nature, poyson &c.

Our observation is this. *April.* 2. there was thrown up out of the ground of my Garden, in digging amongst other things of this nature, a certian cole-black Beetle of a midle size, and flat shape, and which I have observed elsewhere common enough. These Beetles I dissected upon the account of some curiosity, wherein I had a mind to satisfy my self. But I was surprised to find in their swollen bellies of these *Hair-wormes*, in some three, in others but one onely. These particulars we carefully noted: 1. That upon the incision they crawl'd forth of themselves. 2. That putting them into water, they lived in it many daies, and did seem to endeavour to escape by lifting up their heads out of the water, and fastning them to the side of the vessels; very plainly drawing the rest of their body forward. 3. That they cannot be said to be *amphisbæna*, but do move forward only by the head, which is fairly distinguishable from the Tail by a notable blackness. 4. That the three, I took out of the body of one Beetle, were all of a dark hair-colour with whitish-bellies, somewhat thicker then hoggs bristles; but I took out of the body of another beetle one that was much thicker than the rest; much lighter coloured; and by measure just five Inches and a half long; whereas all the rest did not exceed three inches three quarters.

*An Extract of a Letter enlarging and correcting the former Notes about* Kermes; *and withal insinuating a conjecture of* Cochineil's *being a sort of* Kermes.

*Sir,*

WE must correct as well as enlarge our Notes concerning *Kermes*; and yet there will be much difficulty

* *Compare herewith, what was published in* No. 71. p. 2164. No. 72. p. 2177. *especially* No. 73. p. 2196.

difficulty in resolving the question concerning the Original and Efficient of *Kermes*. These things are certain.

1. That we have this year seen the very Gumm of the *Arpicok* and *Cherry-lawrel-Trees* transudated, at least, standing in a Crystal-drop upon some (though very rarely) of the tops of these *Kermes*.

2. That they change colour from a yellow to a dark-brown: that they seem to be distended and to wax greater, and from soft, to become brittle.

3. That they are fill'd with a sort of *Mites*; that small powder (which I said to be Excrement,) being *Mites* as well as that *Liquamen* or softer pulp (which I took to be Bees-meat;) concerning both which particulars I am pretty well assur'd by my own, and also by my ingenious friend, Dr. *Johnson of Pomfret's* more accurat Microscopical Observations.

4. That the Bee-grubbs actually feed on Mites, there being no other food for them.

5. That there are other *Species* of Bees or Wasps besides those by me described; which are sometimes found to make these Mites their food: Dr. *Johnson* having open'd one Husk, with one only large Maggot in it.

6. That there are probably different sorts of Mites in these Huskes, making possibly different *species* of Kermes: For, some I have found to hold Carnation-colour'd Mites, enclosed in a fine white Cotten, the whole Husk starting from the Twiggs, shrivelling up, and serving only for a Cap or Cover to that company of Mites. Other Mites I have seen white, and (which is most usual) the Husks continuing intire and not coming away from the Twigg they adhere to, and but little Cotton at the bottom. Those of the first sort are the white Cob-webbs on the Vine, described by Mr. *Hook Micrograph.* Obs. 56.

7. That shrivell'd Cap to be found upon the Mites inclosed in Cotton, as also the whole Husk it self, if

taken early in *April*, while sott, will, dried in the Sun, shrink into the very figure of *Cochineil*: Whence we guess, that Cochineil may be a sort of *Kermes*, taken thus early and sun-dried.

Hitherto the Summers Note concerning *Kermes*. This advantage at least we may have by them, [illegible] the account, taken from M. *Verney* by Dr. *Crane*, and publish't in one of the *Transactions*, is made more intelligible: the small Scarlet powder, there mention'd, being to be understood of those Mites; and they to be distinguish't from the Bee-grubbs, which are chang'd into the Flapping Fly, that is, the Bee, (for kind at least) by us described formerly, I am, &c. *York Octob.* 9. 1671.

See Numb. 20. p. 361.

*A Description of an odd kind of Mushrom [illegible] Milky Juice, much hotter upon the tongue than Pepper,* &c. Novemb. 15. 1672.

THe 18 of *August* last I passed through *Martin* woods under *Pinno-moor* in *Craven*: In the Woods I then found an infinite number of *Mushrums*, some with-[illegible] They were of a large size, [illegible] *ordinary red-gilled* [illegible] or Champignon, and [illegible] of their shape, that is, with a perfectly round [illegible] or Stool (as we vulgarly call it,) thick, fleshy, not [illegible] and round Foot stalk, of about a fingers breadth [illegible] bove ground, and ordinarily as thick as my thumb. If you cut any part of this Mushrom, it will bleed exceeding freely a Milk-white Juice, concerning which [illegible] 1. That this Milky Juice tasts much hotter upon the tongue than Pepper. 2. That it is not clammy to the touch. 3. That the Air does not much discolour it, on the

the blade of a knife; as is usual with most Vegetable Juices. 4. That it became in the glass viol, I drew it into, suddenly concret and stiff; and did in some daies dry into a firm Cake. 5. That it then also, when well dried, retain'd its fiercer, [illegible] taste [illegible] colour.

Further, I observ'd these Mushrooms, full of Juice, not to be chaured upon our tongues, to [illegible] with Fly-maggots. Also, the youngest and tendrest of them, that is, such as are most Juicy, to have been very much eaten by the *Grey meadow naked Snail*, lodging themselves within the sides of the plant.

Concerning this kind of biting Mushrom, I find in a certain late discourse of the *State* of *Russia* these words; *Groonshidys Fungorum maximi, palmam lati, instar Omasi bibuli sunt, crassi & candidi; dum crudi sunt, succo (lactis putà) abundant. Eos sicut Tithymallum muriâ corrigunt Rutheni; aliter saucos & gutter [illegible] Ipse semel [illegible] non sine suffocationis periculo.* The reference to the Ours or Figures is here confused, and the description too concise, to say that Ours agrees in any thing with Theirs, save the great acrimony of the Juice they both yeild.

I may sometime acquaint you with the Medicinal Uses, I have caused to be made of this [illegible] in the mean time I shall only mind you of the great [illegible] hath with *Euphorbium*.

Since this Letter the Author thereof was pleased to give us this further Account in an other of *Decemb.* 17. [illegible]

——Mr *Wray* return'd me this Answer to my Letter about the biting Mushrom;

"At my return to *Midleton* I found a Letter from "you, containing the Description of a Mushrom by you

 discover'd

" discover'd in *Merton*-woods unde *Pinno moor*. I doubt " not but it is that described in *Joh. Bauhin l.* 40. *c.* 6. " under the title of *Fungus piperatus albus, lactea succo* " *turgens*. Only he saith; 1. That it doth in bigness ex- " ceed the *Champignon*; whereas you write, that there are " few of them much bigger than *that*: But yet in say- " ing so, you grant them to be bigger. 2. He saith, " for their bigness they are not so thick as *that*; you de- " scribe yours to be thick in flesh. In all other points the " Descriptions agree exactly. For the *colour*, of that " it is white, Gills and all; for the *place*, that it grows " in woods; and for the *taste*, that its hotter than Pep- " per. Several particulars mention'd by you, are not " observ'd or not mention'd by him. I cannot say, that I " have as yet met with this Mushrom.

*A further Account concerning the Existence of* Veins *in all kind of Plants; together with a Discovery of the Membranous substance of those Veins, and of some Acts in Plants resembling those of* Sense; *as also of the Agreement of the* Vernal *Juice in Vegetables with the* Blood *of Animals, &c. Communicated in a Letter of Januar.* 8. 1673. *and exhibited to the* R. Society.

SIR,

WE have formerly given you certain reasons for the Existance of *Veins*, (analogous to those in Animals) in all Plants whatsoever, not Mushromes excepted: To which we might add others of later notice; as the skin of a plant may be cut sheer off with part of the spongy *parenchyma*, and no signs of Milky juice follow, that is, no breach of a vein. Again, we have stript the Plant of its skin, by pulling it up by the roots, and exposing it to the wet weather, until it became flaccid as a wet thong, without any injury to the Veins,

which

which yet upon incision would freshly bleed. These Experiments, I say, make against the general opinion of one only sap loosely pervading the whole plant, like water in a sponge.

And though we have made these and many other Experiments to facilitate an ocular demonstration of these Veins; yet we have not been able to effect it to our mind, and subject them as nakedly to our eye as we could wish, for a through-information of their Use, and a minute and accurate discovery of all the particular Accidents belonging to them as such vessels. This, I say, is a work of much labour and patience; and that which renders matters very difficult, is the infinite number, smallness and perplexity of these Veins.

In the Transverse cuts of Plants, we see as it were a certain Order and Number the bloody orifices of dissected veins. We observe also in a Leaf, which we take to be the simplest part of a plant.

1. That the Veins keep company with the Ribbs and Nerves (as we vulgarly call them,) and are distributed into all the parts of the Leaf, according to the subdivisions of those nervous lineaments, and are disposed with them into a certain net-work; whether by Inosculations or bare contact only, we pretend not to determine.

2. That in a Transverse cut of a Leaf, the middle Fibre or nerve, for example, seems to yeild one big drop of a Milkie juice, springing as it were from one vein; yet the Microscope plainly shews us, that there are many veins which contribute to the making up of that drop.

3. That if a Fibre or nerve be carefully taken out of the Leaf, the Veins will appear in it like so many small hairs or pipes running along and striping the nerve.

4. That those many veins are all of an equal bigness,

for

to be more certain of the ramifications of the Fibres, wherein those veins are, we yet are so, that those veins do any where grow less and smaller, though probably it may be so. That which makes us doubt it, is the exceeding smallness of these veins already, even where we might probably expect them to be Trunk veins and of the largest size; and being there also in very great Numbers and running in direct lines along the fibre, we guess, that one or more of them may be distributed and fall off on either hand with the subdivisions of the fibres, and not suffer any diminution in their bulk.

6. That we cannot discern any where throughout the whole plant larger or more capacious veins, than those we see adhering to the fibres of the Leaves; which do also appear from comparing the bleeding Orifices in a transverse cut. I have found it a difficult and laborious task, to trace and unravel them throughout the whole plant.

Our opinion is, that these Veins do still keep company with their respective Fibres. And as all the Fibres of the Leaf are joined in the Stalk of the Leaf, and that stalk explicated in cloathing the Twig or Stem of the plant, (which we take to be the reason of the orderly breaking forth of the Leaves.) so do we think of the Veins, their perpetual companions. And, as we have said, the Fibres of the Leaves are joined in the Twig; so are those of the Twigs in the Branches; those of the branches in the Trunk or body of the tree: The like also in an inverted order we seem to observe in the several Coats and Ramifications of the Root. This the several Circles of bleeding Orifices in transverse cuts seems to confirm.

But more in the Roots of plants, if a simple Coat be separated

ſeparated and expoſed betwixt your eye and the light, the Veins appear to be ſtrangly intangled and implicate, and not in the ſimple order, as in the Leaves. The like we think of the Bark of the bodies of Trees, which we cannot diſtinguiſh from the Roots of plants; though there is, indeed, ſomething (at leaſt at certain ſeaſons of the year) in the Root, which is not to be found in any part of the plant beſides.

From what hath been ſaid, it may well be doubted, whether there is any *ſinus* or common Trunk, into which all the veins are gathered? But rather, each exiſting apart by it ſelf. We indeed have found it very difficult ſo to exhauſt the plant of its milkie juice, as to kill it, though we have given it very many inciſions to that purpoſe. Divers other inſtances there are, which favour the Diſcontinuance of the Veins, and the little relation and intercourſe they have with one another; as one branch of a Tree having fair and well grown fruit, before the other branches of the ſame tree and fruit bloſſom or have leaves; from the different ſituation and other circumſtances of culture; the indefinite and perpetual growth of a Tree; the Cyon governing, &c.

And thus far we have taken our information concerning theſe Veins, partly by the appearance they make in tranſverſe cuts, and partly by the help of a Microſcope; which laſt indeed has ſhewed us ſomething of their number, magnitude, order, diſtributions, &c. And yet neither of theſe helps in our hands has ſatisfactorily diſcovered to us other particulars belonging to theſe veſſels, as external Figure, Coats, Cavitie, &c.

The ſubſtance of theſe veins ſeems to be as truly *Membranous*, as the Veins of Animals: A Leaf will not give way and be extended, but the Veins in a leaf, if freed of all the woody Fibres, will be ſtretched out

to one third part at least, and vigorously restore themselves again, just like a Vein, Gut, or any other membranous *ductus* of an Animal. Again these membranous Pipes are exceeding thin and transparent, because they suddainly disappear and subside after their being exhausted of their Juice; and particularly in that we see the liquor they hold, quite through our Veins, or (in *Chelidonium majus*, for example) a tincture of Saffron in Crystalline Pipes.

Concerning the External Figure of these Veins and Cavities, as well as other Accidents, we thought, they would have been made more apparent to us, if it were possible to coagulate the Juice they hold without much shrinking the plant. We were in hopes, *Freezing* would have effected this; which though it did not succeed as we promised our selves, in respect of the manifestation of these Accidents; yet it gave us some further light into the nature of the Juice of these veins. In the keenest frost, which hapned the other winter, we dissected the frozen leaves of the *Garden Spurge*. Here we observed, that all Juice (besides that which these veins hold) was, indeed, frozen into hard Ice, and to be expressed out in the figure of the containing pores; but the Milkie-Juice was as liquid as ever, but not so brisk as in open weather.

This Experiment we take to be good proof of the perfection of this Milkie Juice, and that it hath within it self so great a degree of fermentation, that it preserves it self and consequently the whole plant from the injuries of the weather; that is, the plant owes it life to it. Thus we have seen Insects (as *Hexapode*-worms, &c.) ly frozen upon the snow into very lumps of Ice, which did not only cause the glass to ring we struck them against, but did endanger the breaking of it: And yet, put under the glass and exposed to the warmth of the fire,

fire, they quickly recovered their legs and vigour to escape; which we think could not be, unless the Vital liquor of their veins, as in this Instance of plants, had been untouched and little concerned in the frost. Further, we hence also argue the different *Uses* as well as *Natures* of these Juices; and look upon the frozen Icicles or that copious dilute and Limpid sap as *Alimental*; the Milkie and not frozen Juice, as as the only proper *Venal*.

As to the motion of these Juices, these things are certain;

1. That the *Milkie* Juice alwaies moves and springs briskly upon the opening of a vein; the *Limpid* sap but at certain seasons, and as it were by accident, and not (as I judge) from any vital principle or fermentation of its own.

2. The *venal* juice hath a manifest intestine motion or fermentation within it self; witness (besides what hath been just now said of it) its contributing (and the long continuance of) that motion to the most insensible liquors; and likewise its thick and troubled bleeding, like the rising of yeast, which yet in a few hours after drawing falls, and the juice becomes transparent, as the Gum of the *Virginian Rhus*, &c.

I shall not desire any person to acquiesce wholly in a bare fermentation; but endeavour a happy discovery of the Frame of *all* the parts of a plant, on which perhaps this motion may much depend. In the mean time we must indeed needs think (according to the knowledge we yet have of the parts of plants,) that these juices move by a far different contrivance of parts from that of Animals; not yet here discovering any uniting of veins into one common Trunk, no Pulsation, no sensible stop by ligature, no difference in veins, &c. All which difficulties notwithstanding may, I hope, in time may be happily overcome; and the Analogie betwixt Plants and

plants may indeed be different, though at present we cannot tell wherein they are so. The Arteries within their heads are hardy to be known by the eye from the Veins. Further there are natural and spontaneous excretions or venting of superfluous moisture in plants, visible and constant, in the *Crown Imperial*, *Rorella*, *Pinguicula*, &c. As to the Ligature, as it hath been hitherto applied by us, it is not to be relyed on for discovery of this motion; the Veins only of plants being the parts probably distendable.

Lastly we shall not omit to tell you, that either we must take that away from the other reasons given of the necessity of the Circulation of the blood in Animals, *viz.* the hindring of its breaking and clodding; or we must grant the same motion to the *Venal* juice in Plants: we having undeniable Experiments to shew, that the Venal juice of Plants and the *Blood* of Animals agree in this, that they both, when they are once drawn from their respective veins, do forth-with break and coagulate, and that the *serum* in the one as well as in the other becomes a stiff gelly by a little standing.

But of the different natures of the juices of these viens in divers Plants and their motion we will remain your debtor, and acquit our selves when we shall find it convenient; at present only acquainting you, what variety of Experiments hath taught us, that probably more useful preparations and certainly a truer Analysis and separation

[illegible] than after [illegible] have lost their [illegible]

*A Letter dated* May 22. 1673. *in* York, *concerning the unalterable Character of the* Whiteness *of the* Chyle *within the Lacteal Veins; together with divers particulars observed in the Guts, especially several sorts of Worms found in them.*

I Come to your Letter, where the Analogy betwixt the Veins in Plants and the Nerves in Animals, hinted by Dr. *Wallis*, is a considerable notion, and I shall set my self a task e're long to examine them both again on purpose, and to give you my thoughts. In the mean time, I will entertain you, if you please, with some Anatomical Observations and Experiments.

It hath been long in my thoughts and desires to have discovered the *Actual passage* of the Chyle into the *Lacteal Veins*; of which yet I never doubted, as I find some do at this day. The difficulty lyes in the certain and unalterable character of the Chyle's *Whiteness*, especially when received into those Veins. And yet it is as certain, that in a *Diabetes* the Urine retains all the qualities of the liquor drunk. Also in that famous instance of those that eat the fruit call'd the *Prickle-pear* (if I remember aright,) their Urine hath affrighted the Eater with the colour of bloud, that is, with the not-alter'd colour of the Juice of the Fruit. In these instances at least we cannot doubt but the Chyle, even in the *Lacteal Veins*, was qualified according to the food and drink.

To effect then something to this purpose, we have formerly, and that very often, repeated the Experiment

of injecting highly tinged liquors into the Guts of a live Animal. It would be too tedious and impertinent, to write down the circumstances of many different tryals: We will only in short tell you the manner of performing it and the success.

We laced the skin of the *Abdomen* of a dog loosly for a hands breadth, and then opening it underneath the stitches, we took out either the *duodenum*, or any other of the *tenuia intestina*. The Gut, took out, we open'd with a very small orifice, and having ready the tinged liquor luke-warm, we injected it upward and downward: Carefully stitching up the gut, and then drawing the Lace, we unlooſed two of the Dogs feet, laying him on his side for what time we thought convenient. The tinged liquors we used, were good *Barbado's* Indigo, in fair water, and filtrated; also lumps of Indigo thrust down his throat; good broath (as they call it) of a blew fat; Indigo in Milk; Saffron in Milk. Again, we tried in some Dogs fed before hand, and injected the liquors in the very hight of the Chyle's distribution; into others yet fasting, and that for a longer or shorter time.

The Success was so constant, that we cannot say, we ever did find the least discolouring of Chyle on the other side the Guts, that is, within the Lacteous Veins, but ever white and uniform. Whence we judge it not very feasible to tinge the Venal Chyle in a well and sound animal. And He that would demonstrate the matter of fact to the Eye, must probably do it by giving him some such thing in the food, as shall cause a *Diabetes*, or some distemper equivalent to it.

Though we have observ'd many odd things in the several Exercises of this nature; yet we shall not trouble you at present with any other particulars, than what we have further observ'd in the *Guts*, to which we

shall confine our paper. Of these we shall proceed to speak though possibly the the things may be better known to you already.

As 1. of the *Glandulæ miliares* of the small Guts, which may also in some Animals be well call'd *fragiformes*, from the figure of the one half of a *Strawberry*, and which yet I take to be *Excretive* glandule, because *Conglomerate*.

N.B. Peyerus did not Publish his Book of these Glandulæ till the Year 1677. viz. more then 4 Years after my discovery of them and Publication in the Philosophical Transactions.

2. The *Vse* of the *Intestinum cæcum*, subservient to that of the *colon* and *Rectum*; manifest in such Animals where Nature intends a certain and determinate figure to the Excrements.

3. Of some sorts of *Worms*, we found in the Guts. And first of the *Lumbrici lati* or *Tape worms*. Of these, I say, we found in the guts of one Dog, perhaps more than an hundred in all. The *duodenum* was exceedingly stuffed out and extended with them. Which also well agrees with an other Observation I made in a Mouse, where I found the *duodenum* to be far bigger than the Stomach it self, by reason of the great numbers of these worms for *kind*, which were contained in it: For *kind*, I say; for these *Tape worms* were of a quite different shape from those of the Dogs or any that I have ever yet seen. To proceed, we found them also in the Dog's *Jejunum* and *Ileon*; but not any one lower than the *Valvæ coli*, nor any higher than the *duodenum* or within the *Pilorus*. Below the *duodenum* they lay at certain distances one from another, though sometimes by pairs or more of them twisted together. Near them was constantly to be observed an Excrement of their own, distinct, for colour (the observation being made in a Dog plentifully fed for other purposes) just as we find in worm-eaten tracks of wood, where the *Teredines* leave behind them the wood which hath past through their bodies: These worms lay mostly with the

the small ends upward, as seeding upon and expecting the Chyle in its descent. These *lumbrici lati* were none of them above one foot long, and most of them of an equal length and bigness. The one end was as broad as my little finger-nail, and pointed like a *lancet*; the other end, coming small gradually for the whole length of the Animal, was *knoted*, or ended in a small button like a pin-head. They were every-where and in all parts of them alike milk white, of a flat and thin substance like fine Tape, divided into infinite rings and incisures; each incisure having *sharp angles*, on both sides, *looking* to the broader end standing out beyond each other: else the sharp corners of the *annuli* would necessarily hinder the Ascent of the Animal; whereas, if the contrary be true, they serve to keep it up. Each ring hath also on the one side only, and that alternately, one small protuberance, much like the midle feet of the body of some Caterpillers.

After I have thus described them to you, I desire you to view the Cut of *Tulpius* in the last years Edition of his *Medic. Observat. l.* 2. 42; where he retracts the first *figure*, given us in the Edition of that book in the year 1652. And yet I cannot say, that all in this last is true; for, to me, the *ribs* and eye in the there supposed head of the animal seem to be the meer fancies of the painter; not to say, that probably the smaller end is the head, which, indeed, is in this Cut wholly neglected. Comparing our Animals with that Cut of *Tulpius*, it was not very easy for me to observe, because of the great resemblance, the specifick difference of the *lumbrici lati* of Men, and those of this Animal.

I was not so happy as to discover any motion in any part of them, in water or out of it, nor did they seem, if pricked or otherwise hurt, much if at all) to contract themselves or shorten the *Annuli*, so that they then appea'd to me as things without motion or sense.

There

There is an other sort of *lumbrici lati* to be met with very frequently also in Dogs, called *Cucurbitini* from the likeness each *annulus* or link hath to a cucumber seed. I have found of them about half a foot long, but more often broken into shorter pieces. The *former* by us discribed is undoubtedly a compleat and entire Animal; but there is great reason of suspition, that *this is a chain* of many Animals linked together. These Animals for Kind have been observed to have been voided by Men, and found enclosed in a Gut or Membrane of a prodigous length: And (which is more notable,) a person of great integrity and worth, Mr, *F. I.* affirmed to me, that he once assisted at the opening of a Dog, in which one of the Kidneys was observed to be quite wasted and become a perfect bladder, and in that bladder they found something like an Animal of a monstrous shape, which being dissected, was nothing else but a skin full of these *lumbrici cucurbitini*. † It were to be desired, that such as have the oppertunity of such rare *Phænomena*, as of Snakes, Lizards, Beetles, Catterpillers, Toads and such like things, as we read of in Medicinal histories to have been vomited, whether they are not the like disguises of this sort of Worms, much assisted by the surprised fancies of the first Observers. † V. Kerkring, Spic. Anat. Obs. 59. 79.

And because these sort of Wormes are sometimes said to be found out of the Guts, their most proper place, we shall conclude with a very recent observation of the last month in this City. A Chirurgion brought me about 20 worms, which he had just then taken out of an ulcerated Ankle of a Girle of about eight years old. I had the curiosity to go my self and see it. I found the leg sound all but the Ankle, which was vastly swell'd, and the Girle otherwise hearty and well coloured. She had been in great misery for some months; had been sent up to *London*, where she was touched and dressed

for the Evil. Sometimes after her return, her pain continuing, a young Puppy was opened and applyed to the Soars. The Chirurgeon, who took off the puppy, found it, to his great admiration, full of worms, at least 60. in number, what those he found in the body of the Puppy, and what he drew out of the four Ankle; into which, he said, they crawled down as worms do into the Ground. The same puppy was again applyed, and it was then (at the second taking of the puppy) that I made the visit, and saw only one worm got out into the puppy, but a very live and stirring one. Many were afterwards kill'd by injections. These worms I affirm, according to my best Knowledg, (and I had the opportunity of comparing them) were of the very *Species* of the *Lumbrici teretes*, which Children familiarly void from the Guts. They were betwixt three and four inches long; all, about the matter, of an equal bigness, as of one brood; something thicker than a Ducks quill; very sharp at both ends; stiff, and exactly round; without incisures, visible at least, and yet could move and twist themselves readily enough. All the difference was in the colour, these being much whiter than any I have seen from the Guts. *Vid. Bartbol. in Hist. 60. Cent. 5.* where neer twenty worms, as long as my finger, were found in a Lady's arm, probably of this *Species* too.

I beg your pardon for my, &c.

*Some Papers written about the same time to* Mr. Oldenburgh, *in whose hands they remained unpublished.*

1. Paper.

THe passage of the *Chyle* through the *Intestines*, into the *Lacteous Veins*, is a thing hitherto demonstrated to the eye by none. Dr. *Lower* ingeniously confesses

fesses the ill successe he had in trying [illegible] of [illegible]ed Spirit of Wine, by neither of which he was able to force a passage. And J. *Wallæus* is very positive that however the Chyle in the Intestines may be diversly coloured, yet it is still white in the *Lacteal Veins*. (*V. Epist. de motu*) Chyle. To this purpose *Diembrooch* in his late anatomie * affirmes "*chylum semper album inveniri in vasis lacteis mesenterij, & thoracis* [illegible] *viridem verò rubrum alterimve coloris in jis à nemine hactenus visum fuisse.* p. 37. Notwithstanding which, and my own Insuccessfull Tryals, I did not doubt, but some happy Experiment would shew the contrary; and a purposely coloured Chyle might find admittance into the *Lacteal Veins*, though not by force, yet by the consent and introduction of nature her self. The successe of some late Experiments we made to this purpose, we shall further acquaint you with.

1. *Experiment*, I caused a Dog to be fed, and after 4 hours, or therabouts (having ready by me a cleer Tincture of Indigo dissolved in fair water filtred) I opned the *Abdomen*, and making a small incision in the *Jejunum*, (as was formerly discribed) I injected one ounce or two. this done, the Gut and all we stitched up again, and the Dog turned upon his leggs. After one hour and one quarter we cut the stitches, where we beheld a copious distribution of Chyle and turgid *Lacteal Veins*, but as white as ever; And yet carefully searching the Guts, we perceived none of the liquor injected any where.

2. *Experiment*, An other Dog which was kept fasting 40. houres, a very little flesh, without water, given him, some 5 houres before the injection of the Tincture of Indigo, which was done after the same manner, as before related, only the Tincture was well warmed, and some 12. ounces throughn up the *duodenum*, and down the *Ileon*. Here were empty Guts, nor the least ap-

 pearance

pearance of any *Lacteal Veins* in the Meſenterie. After full 3 hours the ſtiches were cut again (ſome occaſional buſineſſe hindring me from doing of it ſooner) and carefully examining the Meſenterie, we found many *Lacteal Veins* of an azure colour, and cutting ſome of the biggeſt of them aſunder we did plainly ſee a thick blewiſh *Chyle* to iſſue forth, and to ſpread it ſelf over the tranſparant Membrane of the Meſenterie. This is a very truth, which the Chirurgion, I imployed to aſſiſt me in the Experiment can well witneſſe, and whoſe eyes I uſed as well as my own in carefully examining theſe matters. whence, although it hath been doubted of by ſome, yet it is moſt evident, that the *Lacteal Veins* receive, what they carry, from within the Cavitie of the Inteſtines.

As to the bunches of *Glandulæ* within the Guts, I have obſerved them in ſeveral kinds of Animals at divers times, and do therefore think them natural and not adventitious or morbous, as ſome were pleaſed to object. Theſe *Glandulæ* protuberate, and are thereby viſible in any part of the ſmall Guts, where they are to be found. In the *duodenum* of a Dog, I have ſeen many cluſters of them, ſome as broad as my nail, and all diſpoſed in an oval figure, like the half of a *Strawberry*, or *Mulberry*. They are very viſible in the Guts of *Mice*, where each grain ſeems much larger than in a Dog. Again the part, where theſe *Glandulæ* are, ſeems more thin than the reſt of the Gut, and therefore the Gut ſlit, and held betwixt the light of your eye theſe grains are very conſpicuous. Further theſe *Glandulæ* (like the reſt of the Conglomerate kind) empty themſelves into the Guts, which is manifeſt by the compariſon of them, and therefore ſerve for the excretion of ſome Saliva-like juices, but whether they may not alſo introduce the Chyle, I will not determine here.

A

*A Second Letter writ about the same time, 1673. to the same Person.*

I did not think of explaning my sense of the use of the *Cæcum* until I had had the Leisure and opportunity of purposely examining the *Intestines* of most kind of Animals. But because I am much mistaken by the person, who, as you tell me, is desirous to be *anonimous* to me, him I mean who raised the scruples you sent me, upon the Second Paragraph, which says, the use of the *Intestinum Cæcum* to be subservient to that of the *Colon*, and *Rectum*; manifest in such Animals where Nature intends a certain, and determinate Figure to the Excrements, I shall be forced to tell you, what I presume may prove, as neer the truth, as any one of the many conjectures extant in Authors, about the unknown use of this part. I understand by determinate figure, *First*, the Excrements divided into many small parts of a like shape, such as Sheep, Deer, Conies, Rats, Mice, Horses, Catterpillers, Some Snailes *&c.* doe void. *Secondly*, in a greater Latitude, I oppose figured Excrements to Liquid, as *C. Celsus* in some place doth; Thus the dung of Pigeons, and Geese, of Men, Dogs, Cats, *&c.* may be said to be figured. Now the *Cæcum*, in my opinion, is subservient in some measure to the figuration of both, but most manifestly in the first kind. My meaning is that probably the use of the *Cæcum* is to keep the Excrements, that passe into its cavitie (and I believe all, or most part of them do in sound Animals) so long, until they are sufficiently drained, baked, hardned, or of a due consistence, (as clay is temperd for the mould) to receive the Figure to be given from the *Colon* and *rectum*. This use I say of the *Cæcum*, seems to me to be much more manifest in such Animals, as have figured Excrements of the first kind. In Ratts for example, (whose Excre-

red, of any Sanguineous Animal I have met with) the *Cæcum* is more large, and capacious, than the ſtomack it ſelf, and perhaps than all the ſmall guts put together. But its uſe in receiving the Excrements or exhauſted Chyle, is not more apparent, from its large capacity; than that other of further draining and tempering them to a fitneſſe, for the ſervice of the *Colon*, from the admirable contrivance, and ſtructure, of this latter Gut, which is a *Phænomon* that deſerves further conſideration: it is I ſay to be noted, that immediately under the Value of that Gut, in this Animal, are certain Spiral Fibres, which make a kind of ſcrew. Now it ſeems to me, that the Excrements, after they are brought to a due Conſiſtence by the *Neceſſarie ſtay* they make in the *Cæcum*, and being carried out thence into the Spiral folding, or ſcrew of the *Colon*, cannot deſcend in a perpendicular, as formerly through the ſmall Guts, but ſtill gently glide very leiſurly by the winding of the ſcrew; whence ariſes their Figure.

And I am apt to believe, that if the *Cæcum* of a *Katt*, or any of the firſt kind of Animals mentioned, was tyed up, or otherwiſe hindred from its receit, the Animals would unavoidably fall into a *Diarrhœa*: there being, I ſay, no reaſon, that I can foreſee, why the yet liquid Excrements or exhauſted Chyle, ſuch as we conſtantly find it, even at the very bottom of the ſmall Gut, ſhould ſtop at the entrance of the *Colon*, and not ſpeedily glide through the ſcrew, in a down right deſcent; that is, elude the deviſe of nature, and make the configuration of that ſo curiouſly contrived part uſeleſſe, we I ſay ſuppoſing the Experiment to have taken away the neceſſarie *Diverticulum* and repoſitarie of the unprepared Excrements, in tying up the *Cæcum*.

I know not, whether the observation will hold good in general Terms, because I say, I have not yet purposly examined divers Animals in nature, *viz.* That the more accurately figured the Excrements of any Animal are, the more capacious is the *Cæcum*, and on the contrary the less figured and liquid they are, the lesser the *Cæcum*, or none at all. This is true certainly that some Animals, which are naturally loose have no *Cæcum* at all or very little, as the *Talpa*, the *Echinus terrestris* the *Gulo*, a certian kind of voracious Woolfe, mentioned by *Bartholine* in his Observations.

We shall not trouble you at present with our observations concerning the different Figure of Excrements in the divers Species of Animals already by us examined, nor of the place and of their becoming so figured. Also we shall passe by our thought for the present of the manner of the *Cæcums* reception and preparing the Excrements.

For the *Colon*, we likewise forbear to offer some doubts we have, concerning natures end, in the necessarie Figuration of Excrements in some Animals, at first to prevent *Diarrhœas*; Secondly to abide hunger the better; thus Snails in Winter rest with full Intestines; Thirdly to heighten the fermentation and digestion of the stomack and small guts.

What we have hastly writ at present, being only intended for the better understanding of that Paragraph, and not all that this subject would incite me to say.

If it shall be objected, that grant the reception of the exhausted Chyle to be made in the *Cæcum*, before it passe into the *Colon*: yet it seems that either we must give a power of *choice* to the *Cæcum*, or what just comes in, will first be thrown out, it still being uppermost, that is, the lesse prepared excrement. I answer, that I do not conceive, what *choice* or distinction Sheep can

make

make of the meat not ruminated, in the ſtomack, from that, which is but juſt now ruminated, and ſwallowed down, ſince all the many ſtomacks of a ſheep are but one ſtomack and but one Gula, that is, in that reſpect of ruminating the ſtomack and *Gula* of a Sheep or Cow, is an other *Cæcum*; and yet in ruminating nature has its time, and chews not things ofner over, than needs muſt; the like we think of the office of the *cæcum*, which parts only with what is duly prepared, and retains the yet liquid Excerment.

3 Paper.

*Some probable thoughts of the whiteneſſe of* Chyle; *and what it is after it is conveyed within the Arteries: Communicated much about the ſame time with the former.*

N.B. *I am not altogether of the ſame Opinion Now; yet, they were my thoughts than.*

1. IN digeſtion of meat in the ſtomack, there is made a ſeparation or ſolution of Urinous ſalts; no otherwiſe, than in the *rotting* of Animals, or Plants.

2. The Chyle is hughly impregnate with this Urinous Salts.

3. The *Whiteneſſe* of the Chyle is from the Fermentation it hath from its mixture with Urinous ſalts; and that if deſolv'd with fair water, it is wholly deprived of that colour, the firmentation ceaſing.

4. The Salt Chyle is conveyed into the Venal blood, and with it enters the heart; and it is thence thrown out, Chyle as it comes in by a continued pulſation into the Artery.

5. That as oft as it enters the emulgent Arteries, it there leaves behind it part of its ſalinous liquour or Urine, and conſequently abates of its colour.

6. That when ſufficiently freed of its Urinous ſalt, it becomes a *Lympha*; which we think nothing elſe, but the reſidue of the Chyle, not yet made into the nature of

of blood, as not ſufficiently depurate of its Saline Particles.

7. That probably it circulates long under the nature of a *Lympha*; after viſiting all the parts of the body by the Arteries, and returning again to the Hart, partly by its own veſſells, and partly by the veins.

8. That in defect of Chyle (for we cannot conſtantly feed) nature continually ſupplys the Maſſe of blood with the *Lympha*, or old Chyle.

9. That upon every ſupply of freſh Chyle, much of the old ſtock or *Lympha* is (according to the neceſſitie of parts) converted to this or that uſe: and not till than.

10. That there is ever, *more Lympha* in the maſſe of blood, than there is need off for the diluting of it. the Arterial blood (be the Animal never ſo much exhauſted by hunger) always parting with ſome upon extravaſation and coagulation.

11. In the Coagulation of extravaſate blood there is no præcipitation of parts, as in curdled Milk *&c.* for if the Chyle be freſhly diſtributed into the Maſſe of blood, it will again ſeparate it ſelf, as Oyl will from water; and in like manner is it with the *Lympha* or old Chyle, neither of them being as any eſſential part of the blood.

12. The Venal and Arterial blood have probably both a like quantity of *Lympha* to dilute them; but the Arterial in Coagulating involves within its Craſſamentum more than the Venal: the reaſon may be, for that the Arterial is fuller of air, which rarifies and renders the Arterial Craſſamentum more porous and capacious, of lodging the *Lympha*: which yet as it ſubſides by long ſtanding, parts with and lets goe more and more *Lympha*.

13. The great Inſtrument of Circulation is the Syſtole or Vibration of the Heart; which yet would not be ſufficient from hindring the Coagulation of the blood,

 without

without a continual ſupply of *Lympha* to dilute it.

*An Account of two uncommon* Mineral Subſtances, *viz. of Bitumen, and a White Liquor.* January 7. 1674.

*SIR,*

THat this Letter may be the more acceptable to you, I ſhall communicate ſome *Excerpta*, taken out of the Letters, which that Inquſitive and Learn'd Gentleman Mr. *Jeſſop* is pleaſed to honour me with. I will give, (ſaith he) the beſt anſwer I can in ſhort to the Queſtions, you put to me in your laſt.

1. The *Fungus ſubterraneous*, I ſent you a large quantity of, was gotten in a Rocky Lime-ſtone ground, on a Common about two miles diſtant from *Caſtleton* in the Peake of Darby-ſhire, 15 or 16 yards deep, in the *Old man* (as they call a Mine formerly wrought and ſtopt up) covered with earth, that had either fallen or was thorwn in. There is no coal-bed that is knowu of within five or ſix miles of the place.

Of this *Fungus*, by Mr. *Jeſſops* procurement, I received a good quantity; and yet I am not able to ſay, in what form it grows. It does not ſeem to me to have any conſtant ſhape; at leaſt the pieces that I receiv'd are much like Peats or Turff, cut up in the high moosr, bothe in the ſooty colour and inward ſubſtance; this ouly is more clammy and tough, and dries not. And ſome of the fungous ſubſtance is very ſoft and like geliy. In and about the more ſolid pieces, (of which I have ſome, half a ſoot ſquare,) are many big lumps of a *bituminous* ſubſtance. This *bitumen* is very inflammable like Roſin; it is very light, it breaks firm, and ſhines like good Aloes; and for colour, it is not much unlike it, ſave that it is more dark color'd and purpliſh; yet there is much of it of a dark green colour. We diſtill'd a parcel of it, which yielded us an Acidulous limpid

pid waters then, a white liquor, which was, I gues, from some of the Oily parts precipitate. And in the last place, a copious yellow Oyl, not unlike that of *Succinum* or Pitch. In the neck of the Retort we could discern no Volatil Salt, as in the like process upon Amber. Whether this ows its Original to a Vegetable, or is truly a concret Mineral Juyce and a fossil Bitumen I forbear to determine. I have not read of any such fungous Earth, in which *bitumen* naturally grows and adheres: And the finding of it in an Old mine doth much favour the first opinion of being a Vegetable substance; *either* the very substance of the props of Wood, they make use of in lining and supporting the Grooves, thus alter'd, *or* certain *fungus*'s growing out of them. That Birch, (of which there is great plenty and hath been vast woods all these mountanous parts of *England* over) will yeild a *bitumen*, as limpid as the sap is which runs from it by tapping, if we now had the skill to extract it, *Pliny* is very expres, *l.* 16. *c.* 18. *Bitumen ex Betula Galli exsquunt.* And more-over it is certain, that much of that wood, if not all, which is dugg up in the high moors of *Craven*, and which the people there call and use for *Candle-wood*, is no other than *Birch*, as it appears from the grain and bark; and yet this wood kindleth flames, and exudats a rosin, which makes many pronounce it very *Firr-wood*. Whatever this *bitumen* is, which this *Fungus subterraneus* yeilds, it much differs from the *Asphaltum* of the Shopps; and you may command a *Specimen* of it, that it may be better examin'd by more skilful Naturalists.

2. There is an other Mineral Juyce in these parts of *England*, which I have much inquir'd after, and longed to see; and now I am likely to be satisfied, as you may think by Mr. *Jessops* words: *Captain Wain*, (saith he) *a diligent and knowing person in Mines, gave me a*

*White Liquor, resembling Cream both in colour and consistance, which he found in great quantities at the bottom of a Coal-pit, 49 yards deep, which I reserve for you.* But this is not all the information that hath been given me about this White Liquor. Mr. *George Plaxton*, a curious and very intelligent person, writes thus to me from *Sheriff Hales* in Shropshire: *I shall trouble you with an Observation, I lately met with in our Iron-mines, especially that which the Country people here call the* White Mine, *which yeilds the best Iron-stone. The Miners do commonly, upon the breaking of a Stone, meet with a great quantity of a whitish milky Liquor, inclosed in the Center of it; they sometimes find a Hogshead contain'd in one cavity. 'Tis in taste sweetish; only it hath a Vitriolick and Iron-like twang with it.*

*A Description of certain* Stones, figured like Plants, York *Novemb.* 4th. 1673.

IN this paper I send you an Account of some of the Parts of certain *Stones* figured like Plants; which *Argicola* (5 *Fossilium*) calls *Trochitæ*, and the compound ones *Entrochi*; we in English, St. *Cutberds beads.*

*Agricola* will have them akin for substance to the *Lapides Judaici*; and, indeed, these are of an opaque and dark coloured Sparr; though I have of them from some parts of *England* of a *white Sparr* or *Cawke*, as our Miners call it: They all break like Flint, polished and shining.

Put into Vinegar (*saith he*) they buble: *Atque etiam reperitur interdum qui se tanquam* Astroites *moveat de loco.* But this is true of all Fossils of what figrue so ever, that Vinegar will corrode and dissolve as a *Menstruum*; provided they be broken into indifferent small grains, and the bottom of the Vessel hinder not, they will

will be moved from place to place by it.

The figure of the *Trochitæ* is cylindrical; the outmoſt round or Circle (we ſpeak of one ſingle joynt, which *Agricola* calls *Trochites*) is in general ſmooth, both the flat-ſides are thick drawn with fine and ſmal rayes, from a certain hole in the middle to the circumference. From the ſhooting of theſe rayes like Antimonie, and becauſe a large Peice of this Stone of many joynts reſembles the bole of a Tree, *Aldrovandus* (who yet elſewhere diſcourſes of this Stone, after *Agricola* and *Geſner*, under the name of *Trochitæ* and *Entrochi*) not improperly terms it (*Muſæ: Metallici lib.* 1. *pag.* 188.) *Stelechites Stibii facie*; and there gives us a true figure of it. Two, three, or more of theſe *Trochitæ* joyned together, make up that other Stone, which he calls *Entrochos*. The *Trochitæ* or ſingle joynts are ſo together, that the Rayes of the one enter into the other Furrows, as in the Sutures of the skill. Hitherto we agree to what *Agricola*, *Geſner*, *Boetius*, *Aldrovandus*, *and Wormius* have ſaid of them: We proceed upon our own Obſervations, which go much further.

The Places where we find them very plentifully, are certain Scarrs in *Braughton* and *Stock*, little Villages in *Craven*. The Stones of the aboveſaid deſcribed Figure, as many as have yet come to my hands from thoſe places, have afforded us theſe Particulars. As to their *bigneſs*, I never yet met with any much above two inches about; others there are as ſmall as the ſmalleſt pinn, and of all magnitudes betwixt thoſe proportions. Theſe are all *broken bodies*; ſome ſhorter Pieces, ſome longer, and of them, indeed, *Trochitæ*, that is, but ſingle joynts. I never fonnd one intire piece much above two inches long, and that very rarely too; in ſome of which long pieces, I have reckned about 30 joynts. And as they are all broken bodies, ſo are they found *dejected* and

lying confuſedly in the Rock, which in ſome places, is ſoft and *ſhelly* (as they call it,) that is, rotten and periſhed with the wet and air. And though in ſome places they are but ſprinkled here and there in the Rock, yet there are whole *bedds* of Rock of vaſt extent, which are made up of theſe, and other figured Stones, as *Bivalve*, *Serpentine*, *Turbinate*, &c. as at *Braughton*.

As to the injuries they have received in their removal from the natural *poſture*, if not place of their growth and formation, they are manifeſt. For, beſides their being all broken bodies, we find many of them depreſſed and cruſhed, as if the joynt of a hollow Cae ſhould be trod under foot: Theſe Cruſhes being alſo real Cracks of a ſtone or glaſs. Again theſe ſtones conſiſting of many *vertebræ* or joynts, they are many of them ſtrangely diſlocated; ſometimes two, three, or more of the joynts in a Piece are ſlipped and out of order or rank, and ſometimes a whole *ſeries* of joynts, as when a pack of Crown pieces leans obliquely upon a Table. Futher, others I have that are twiſted like a Cord, if this poſſibly may be reckoned amongſt the injuries. Laſtly, ſome have their joynts, indeed, even and in file, but are yet ſtuffed with a forrain matter, as when bricks are layed in morrer.

There is great variety as to the thickneſs of the *Trochitæ* or ſingle joynts: ſome are ſo thin, that they are ſcarce the full of the 24*th*. part of an inch; others are a full quarter of an inch thick; of theſe latter I only found at *Stock*: Theſe, I ſay, are the extream proportions, as far as my Obſervations have yet gone; there are joynts of all meaſures betwixt thoſe two Extreams. This is true in divers Pieces, for moſtly the joynts are of an equal thickneſs in one and the ſame Piece. Note, that there are ſlender and ſmall *Entrochi* or Pieces, which

which have as thick joynts, as the biggeſt and faireſt Pieces.

There is alſo ſome difference in the ſeames or cloſing of the joynts: Some are but ſeemingly joynted; which appears by this, that if they be eaten down a while in diſtilled vineger, the ſeeming Suturs will vaniſh, as in ſome I had out of *Stafford-ſhire*, from about *Beresford* upon the *Dove*: Others and all here at *Braughton* and *Stock* are really joynted, and the Sutures indented; which indentures being from the terminating of the rayes, they are more fair or large, according to the differenc of the rayes, but even, equal, and regular.

We have ſaid, that generally the outmoſt Circle of each joynt is flat and ſmooth; yet are there many other differences to be noted as to that Part: Very probably becauſe they are Parts or Pieces of different *Species* of *rock-Plants*.

1. That the ſmooth-joynted (to ſay no more of them here) are of different thickneſſes as to the joynts.

2. On ſome *Entrochi* betwixt, Suture and Suture in the middle of each joynt, are certain Knots in a Circle; the joynts thus diſtinguiſhed are very deep and large, and are very frequent at *Stock*.

3. There are likewiſe of theſe with a circle of knots, which have many knots beſides upon each joynt and look rugged.

4. Some with much thinner joynts, which yet have a Circle of knots in the middle of joynt; and this alſo looks as though it was all over knotted, and theſe are found at *Braughton* only, as far as I know.

5. As ſome have but one Circle of knots, others, are knotted all over the joynt and rought; ſo are there ſome others, which have a Circle of larger knots in the middle of each joynt, and a circle of leſſer on each ſide cloſe adjoyning to the border or verge of the Suture.

Suture. This is huge pretty, and they are found at *Stock*.

6. Others betwixt Suture and Suture in the middle of each joynt riſe with a circular edge.

7. A ſmooth *Entrochos* with a large or much riſen edg on the middle of one of the joynts, and a much ſmaller on the middle of an other joynt and that alternatively.

8. The ſame alternate difference, the joynts only much rounder and blunt, and here the joynts are viſibly one thicker than the other.

9. The ſame with alternate edges knotted.

10. A double edg in the middle of every joynt; this makes the joynts look as though they were exceeding thin and numerous, but indeed they are not ſo.

11. A double edg in the middle of every joynt knotted by intervals, or as it were ſerrate edges.

And theſe are ſome of the differences, that I have at preſent been able to make out. Some of the Pieces of moſt, if not all, of the differences of theſe *Entrochi* are ramous, having leſſer branches deduced from the greater, and that without order. Some have but few branches on a Piece; others I find ſo thick of branches, that they reſemble a ragged Staff. Theſe *Branches* are deep inſerted within the ſtemm, and by being ſeparated, leave great holes in the ſides of it. The rayes in the joynts of the branches run croſs to the rayes of the ſtemm. On thick ſtemms, are ſomtimes very ſmall branches, but moſtly the bigger the Stem the thicker the branches. Some of theſe branches are branched again: Yet I find not any of them above one inch intire, and yet adhering and inſerted into its ſtock o bole, and for the moſt part not above a joynt or two. The Branches are known from the ſtemm, by being a little crooked and ſomething tapering or Conic.

We meet but with few Pieces (beſides the branches) that

that are not exactly Cylindrical, ſetting aſide the injuries above mentioned, that is, that are not as thick at one end as at the other, and perfectly round, notwithſtanding that we ſaid, that there are of them of all degrees of magnitude within the proportions above-named.

And, as we ſaid, it is rare to meet with a Piece, that is not exactly cylindrical; ſo amongſt thoſe few that are not ſo, ſome we find tapering at both Ends, and much ſwelled in the middle. And this is the other *Species* of this Stone, according to the diviſion of *Agricola*: *Entrochi duæ ſunt Species; aut enim æqualiter teres eſt; aut teres quidem, ſed pars ejus media tumet, utrumque caput anguſtius eſt.* But this muſt not be underſtood, as though both ends were compleat; for theſe, are but broken Pieces, as the reſt, more ſwelled in the middle.

Others there are figured like a kind of Fruit, or *Lapis Judaicus*; but theſe alſo are truly *Entrochi*, and are joynted notwithſtanding this ſhape. Upon a ſmall Stalk of two or three joynts is ſuddainly raiſed an Oval bottom, broken off alſo at both ends.

To theſe we ſhall add what ſeems to have been *ſummitates* or *faſtigia*; long and ſlender Pieces with a little jointed buttom, hollow on the very top; which top ſeems not to have been divided or broken off from any thing elſe.

I muſt not forget, that as they are hollow in the middle (and ſo it was eaſy to ſtring them like *beads*, which gave occaſion to the *Engliſh* name;) ſo theſe hollows are ſometimes filled with earth, and ſometimes an other *Entrochos* is incloſed like a pair of ſcrews, and which is (as it were) pith to the other. Of theſe inward *Entrochi* ſome I have which are tranſparent. *Note*, that the hollows or piths are of different bores, but moſt are round. And yet there are of them in great plenty at *Stock*, whoſe hollow in the middle is in the elegant faſhion of a *Cinquefoil*; and the rayes of the joynts of

*Entrochi* are much deeper and fewer in number, than of any other yet obſerved by me. Theſe are ſmooth-joynted. This is moſt ſurpriſing, and I know not any Vegetable, whoſe Pith is perforate in ſuch a manner.

Laſtly we in theſe Rocks find *rude Stones*, of the bigneſs of Walnuts, which have many impreſſions of *Trochitæ* upon them, as though they had been the roots of them. And when theſe have been a little cleanſed in Vinegar, theſe impreſſions appear more than caſual; for, the ſubſtance that covers them (if not the Stones themſelves) is Sparr, and the impreſſions are round holes, which, we ſaid above, the Branches made in the ſides of the ſtock, when broken out from them. *Agricola* makes mention of theſe alſo: *Sæpenumero* lapis informis *reperitur unà cum Trochite & Entrocho, Rotæ in ſe continent figuram; quæ in eo quaſi quædam* radix, *Trochitis jam abruptis, remanſit.*

Although there are indeed certain *lapides informes*, which may with ſome colour be thought to have been the Roots, from whence ſome *Entrochi* have been broken; yet are not all ſuch lumps of Stone, on which we diſcern the *Veſtigia* of *Entrochi* to be called *lapides informes*, ſome of them being moſt elegantly figured. One or two of them, which I found intire and compleat at *Stock*, amongſt very many others ſtrangely ſhattered and defaced, I ſhall deſcribe to you.

1. The firſt is in the faſhion of a Pine Apple or Cone, with a hollow bottom: On the very Top is the round figure of an *Entrochus* broken off; round about the bottom or *baſis* are five ſingle feet at equal diſtances, in the figure of Creſcents. This Stone is *incruſtate* or made up of angular Plates; *viz.* the bottom is compoſed of five plates, which we call Feet; the middle of the Stone of five other plates, all of a Sexangular figure; and the Top Stone. All other places are ſmooth on the outſide.

2. The ſecond is a large Stone of the bigneſs of a Walnut,

Walnut, much after the pyramidal fashion of the other; the bottom convex, about one inch and a quarter over; on the top is the lively impression of an *Entrochos* broken off, or rather a *Trochites* yet remaining; round the *Basis* are five *double points* or Feet at equal distances, all broken of somewhat in the figure of Crescents. This Stone also is incrustate or covered with Sex-angular plates, which are rough. I can compare the incrustating of these stones to nothing so well, as to the skins of the *Piscis Tringularis*, which *Margravius* describes: *Cujus cutis (nam caret squamis) figuris Trigonis, tetragonis, pentagonis, hexagonisque mire distinguitur & notatur.*

Of these figured plates I find so great variety in the Rocks, both as to the number of Angles and other beautiful Ornaments, that it has caused in me great admiration. And it will not be amiss, since they manifestly belong, as parts, to the above described stones, to enumerate them, at least, as many as have yet come to my hands. Some of these *angular plates*, I said, are yet visible in their natural place and posture in the described stones: But I find the greatest part of them broken up and heaped together in great confusion in the Rocks. And it will be as hard to set them together, as to skill to tell you, what the figure of an intire *Entrochos* (or the stone to which all the above described parts seem to belong) is: But we will omit no part, that we can justly say belongs unto it. We shall begin with *Pentagonous* plates.

1. The first is a *Pentagonous* Stone, as broad as my thumb-nail (we speak of the fairest of them,) hollow on the one side, like a Dish; convex on the other side, where are certain eminent knots, about the bigness of small pinn-heads, set in a kind of square order: This plate is somewhat thinn at the edges and yet blunt.

2. The second is also *Pentagonous*, and not much nar-

rower than the other: It is, indeed, somewhat convex above, but not hollow underneath; it is smooth on both sides, at least without those eminent knots, which are so remarkable in the other plate: The edges of these are as thinn as of a knife, and sharp.

3. The third *Pentagonous* Plate is not near so broad, as either of the former; yet one I found amongst a 100 of this sort, that is full as any of the above described: These are all convex on the one side and somewhat hollow on the other; thick edged; one of the 5 sides only is indented; the indented side is ever the thinnest, and the stone is most sloped towards that side. *Note*, that there are many amongst these last indented sorts of plates, which are channelled on the concave side and otherwise notched.

4. All these *Pentagonous* plates are to be found plentifully at *Braughton* or *Stock*. But I shall not omit in this place the mentioning of one, I by chance espied amongst certain figured Stons, which I had out of the Quarrie near *Wansford*-bridg in *Northamptonshire*, and it probably belongs to these kind of plates I am now in hand with. It has one of the five sides thick indented; the convex part has in the middle a raised *Umbo*, like some antient shields, and round about the sides list of smaller Studds. We have since had some plates much like this from *Bugthorp* under the Woolds in *York shire*. We proceed to remarke some differences in the *sexangular* plates.

5. All these stones are but small, save here and there one: The first of them is but little hollow on the one side, and convex-side most elegantly wrought with raised or embossed work, that is, with an equilateral triangle bestriding each Corner, and a single right line in the midst; or, if you will, two Triangles one within another. These we found at *Braughton-scar* only.

6. That Plate-stone which is most common in these Rocks,

Rocks, there being a 1000 of these to be found for one of the other, is *sexangular*, a little hollow on the one side and convex side or scabrous only; some are much thicker than others; some being as thick as broad, but most are Plate-like; the sides are very unequal, as in Crystals; sometimes five broader sides and one very small; again two sides broad and four much narrower, and infinite other differences as to the inequality of Sides.

Words are but the arbitrary symboles of things, and perhaps I have not used them to the best advantage. Good Design (and such is that I send you, done by that ingenious young Gentleman and excellent Artist, my very good friend, Mr. *William Lodge*.) or the things themselves, which I have all by me, would make these particulars much more intelligible and plain to you.

*The Explication of the Figures. See* Tab. I.

1. A *Trochites* or single joynt with very fine and small Rayes.
2. A *Trochites* or single joynt with the pith bored through, in the fashion of cinquefoil.
3. A *Trochites* or single joynt, of an Oval figure, the rayes scarce apparent and a very small point in the place of the pith.
4. A single joynt or two of a middle size, with the pith exceeding large.
5. A pack of single joynts dislocated, and yet adhering in their natural order.
6. A very long *Entrochos* or a piece of many smooth joynts with the branches broken off.
7. An *Entrochos* with smooth joynts not branched.
8. The biggest *Entrochos* I have yet seen, with stumps of branches.
9. A smooth *Entrochos* with very thin and numerous joynts.
10. The largest or deepest joynted *Entrochos*, save the oval one noted in the third figure.

11. An

11. An *Entrochos* with very many diſorderly knots in each joynt.
12. An *Entrochos* with one only ſingle Circle of knots in the middle of each joynt.
13. An *Entrochos* with three Circles of knots.
14. A ſmooth *Entrochos*, with a large and much riſen edge in the middle of each joynt.
15. Alternate joynts round or blunt.
16. A double edg in the middle of each joynt.
17. Alternate joynts, edged.
18.19.20. Certain other differences noted in the Paper, but not pefectly expreſt in the Deſign.
21. An *Entrochos* with a branch of a good length.
22. A branch of an *Entrochos* knocked off.
23. An *Entrochos* fruit-like.
24. A *faſtigium* or *Summitas*.
25. A *radix* of an *Entrochos* in *Proſpective*: where A is a joynt or *Trochites* yet remaining, whence an *Entrochos* was broken off. C. E. F. D. are four of the double feet; the *5th.* being hid.
26. The ſame *radix* to be ſeen at the beſt advantage: A the *Trochites* or *baſis*: C. B. D. E. F. the five double Feet. Note alſo the ſex-angular rough plates, which incruſtate the ſtone or cover it all over.
27. A ſmaller *Radix* with ſmooth plates and five ſingle Feet: H. the top ſtone. I. one of the five Feet. K. one of the five angular plates which incurſtate the middle of the ſtone. G. the *baſis*, Alſo the ſame ſtone in proſpective. G. the ſame with the hollow bottom upwards.

Figures of Plates ſuppoſed to incurſtate divers roots.
28. A pentagonous plate knotted.
29. A thinn edged ſmooth pentagonous plate.
30. An indented pentagonous plate.
31. The Northamptonſhire pentagonous plate.

32. A

32. A large pentagonous ſmooth plate.
33. An hexagonous plate imboſſed with angles
34. An hexagonous plate, as deep as broad.
35. 37. Odd figured plates.
36. A quadrangular plate ribbed and indented.

*A Letter concerning* Snails, *with Tables about that ſort of Inſects.* York. *March.* 12. 1673.

I Herewith ſend you the *firſt* part of our *Tables* of *Snails*, and ſome *Quære's* upon that ſubject, I reſerve by me the *Sea-ſhells* and *Rock-ſtones*. That part, I ſend you at preſent, being at a ſtand with me, theſe other increaſe upon my hands daily; which though *that* be not a ſign of perfection (for there is undoubted work for many ages,) yet it is of good advancement and progreſs; *this* other of the copiouſneſs of the ſubject. Again, in that part of the Tables, you have from me, Authors are very little concern'd; in the others of *Sea-ſhells* and *Stone-like Shells* there are many authors, which are to be conſulted and taken in, if poſſibly we can underſtand them treating of the ſame ſpecies. As for *Rock-ſhells* in particular, they come in to me in greater numbers, than I could ever have imagined. And I can aſſure you, that of near 30 *Species*, I have now by me, found in this County alone, not any one can be ſampled by any *Sea*, *Freſh-water* or *Land*-Snail, that I have, or ever ſaw. So that you ſee, I have ſtill good reaſon to doubt of their Original, beſides many other arguments that my Obſervations about *Foſſils* do afford, and which you may poſſibly one day ſee. And that there are the elegant repreſentations of even *Bivalve-ſhells*, which never ow'd their original to any Animal, I can demonſtrate; and think none, that hath conſidered the thing with me, yet hath denyed: Of which hereafter. But whether all

all be ſo or no, I chooſe this method, as the moſt convincing, *viz.* to give a Comparati e view.

*Some general Quære's concerning Land and Freſh-water Snails.*

1. Whether there are other Shell-ſnails at land, than Turbinate;

2. Whether this kind of Inſect are truly *Androgyna*, and equally participate of both Sexes, as Mr. *Ray* firſt obſerv'd; and whether both them two, which ſhall be found in the act of Venery, do accordingly *ſpawn*, or lay thoſe perfectly round and clear Eggs ſo frequently to be met with in the ſurface of the Earth and in the Water too; and the circumſtances of thoſe Eggs hatching?

3. Whether the way of fatting Snails, in uſe amongſt the *Romans*, that is, to make little paved places incircled with water, be not alſo very expedient in order to the true noting the manner of their Generation?

4. What light the *Anatomy* of this Kind of Inſect may give to the reſt?

5. Whether the black ſpots, obſervable in the horns of ſome Snails, are Eyes, as ſome Authors affirm, and not rather parts equivalent to the *antennæ* of other Inſect; as the flat and exceeding thin ſhape, alſo the branched horns, in other Species of Snails ſeem to confirm?

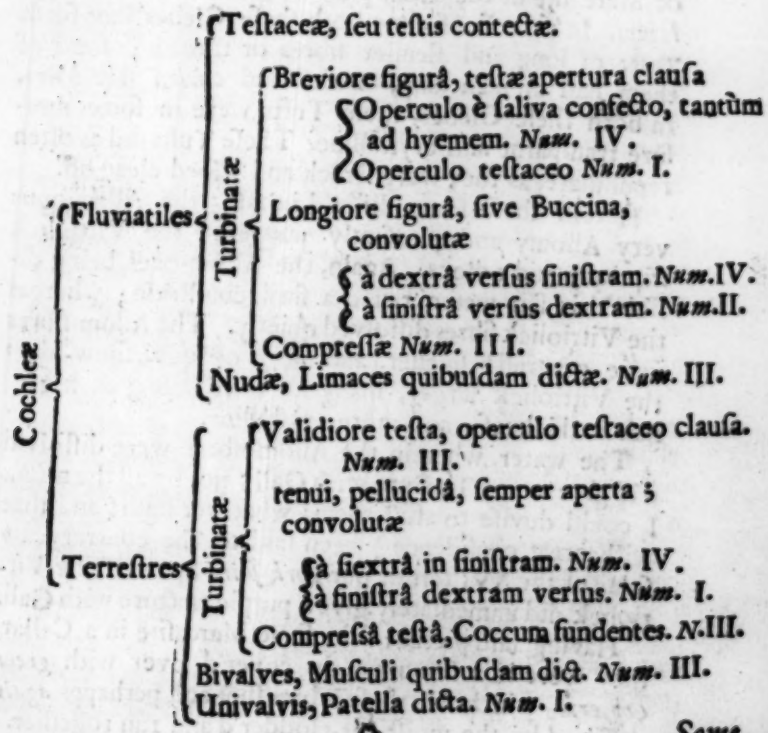
6. Whether the *coccinea Snails*, which ſome of our Water-ſnails freely and plentifully yield, be not a *Saliva* rather than an *extravaſated blood*: The like may be thought of the Juyce of the *Purple-fiſh*, now out of uſe, ſince the great plenty of *Cochineil*?

7. In what ſort of Snails are the *Stones*, mentioned by the Antients, to be found? And whether they are not to be found (in ſuch as yield them) at certain times of the year? And whether they are a cure for a Quartan; or what other real vertues they have?

8. What medicinal vertues Snails may have, as reſtorative to Hectic perſons; and what credit the *Romans* may deſerve, counting them, eſpecially the necks of them, highly venereal; *Celſus* alſo particularly commending them to be *boni ſucci*, and *ſtomacho aptas*.

9. Alſo inquire concerning the Mechanical uſes of the *Saliva* of theſe animals, as in dying, whitening of wax, hair, *&c.*

*Cochlearum Angliæ Tabula.*



*Some Obſervations and Experiments made, and in a Letter communicated to the Publiſher, For the* R. Society. *Philoſophical Tranſactions,* N. 10.

I Shall venture to entertain you at preſent with a few looſe Notes, which you will be pleas'd to take in good part, and diſpoſe of them as you think fitting.

I. *Of the Efflorescence of certain Mineral Glebes.*

I keep by me certain big pieces of crude Allom-Mine, ſuch as it was taken out of the Rock. I had alſo in the ſame Cabinet like peices of the ordinary Fire-ſtone or Marcaſite of the Coal-pits, which here we call *Braſs lumps*. In proceſs of time both theſe Glebes ſhot forth *Tufts* of long and ſlender fibres or threads; ſome of them half an inch long, bended and *curled like hairs*. In both theſe Glebes, theſe Tufts were in ſome meaſure tranſparnt and cryſtalline. Theſe Tufts did as often repullulate, as they were ſtruck and wiped clean off.

Herein theſe fibres differ'd in taſt; the Allominous very Allomy and pleaſantly pungent; the Vitriolick ſtiptique and odious. Again, the Allom-ones, being diſſolv'd in fair water, raiſed a ſmall ebullition; whereas the Vitriolick fibres diſſolved quietly. The Allom-fibres were generally ſmaller, and more opaque, ſnow-like; the Vitriolick larger, many fibres equalling an horſe-hair in thickneſs, and more cryſtalline.

The water, wherein the Allom-fibres were diſſolv'd did give no red Tincture with Gall; not by all the means I could deviſe to aſſiſt them; whatever hath (and that with great confidence) been ſaid to the contrary, by ſome of the Writers of our *York-ſhire* Spaws: The Vitriolick did immediately give a purple tincture with Gall.

Having laid pieces of the ſame Marcaſite in a Cellar, they were in a few moneths cover'd over with *green Copperas*, which was theſe Fibres ſhot and perhapps *again diſſolved* by the moiſt Air, clodder'd and run together.

Expoſing

Expoſing other pieces of the ſame Vitriolick Glebe in my window, where the Sun came, they were cover'd over with a white farinaceous matter, that is, with theſe Fibres calcined by the rays of the Sun and warm Air, beating upon them.

Of what *figure* theſe Fibres were, whether round or angular, I could not well diſcern. But I take theſe fibrous and thread-like ſhootings of Allom and Vitriol to be moſt genuine and natural; and their Angular ſhootings, after ſolution, into Cubes and Rhomboides, to be forc't and accidental; Salts of very different natures, as well Vegetable as Foſſile, by a like proceſs in cryſtallizing of them, being obſerv'd to ſhoot into like figures. But this is not my purpoſe at this time.

II. *Of an odd figured* IRIS.

I have not obſerv'd any Rock or ſort of ſtone, whether Metalline or more Vulgar, which hath not its different ſort of *Sparr*, ſhot in ſome part or other of its bed or ſeams. And theſe Sparrs differ not only in their Colours and other accidents, but eminently too in their Figure. To paſs by divers, which I have collected, I ſhall deſcribe one of a very curious Figure, and which (though very common in our blew-Lime-ſtone Rocks, out of which plenty of Lead-Ore is got,) yet is not, that I know of, mention'd by any Author.

Theſe Cryſtals are moſtly of a black water, like the black flint in Chawk-hills; but there are of them, which have a purpliſh or amethyſtine colour; and there are as clear as cryſtal. They adhere to the ſeams of the rock, be it betwixt bed and bed, or where-ever there are croſs and oblique veins through the very ſubſtance of the bed.

The ſmaller the veins, the leſs the *Iris*. You will find of them as ſmall as wheat-corns, and others an hundred times bigger. They ſhoot from both ſides the the ſeam, and mutually receive one the other.

They are figured thus, *viz.* a column conſiſts of three equin-angular plains, very little rais'd in the middle: theſe plains too are very unequal. Let them hug one another, or be any ways ſtraightned and compreſſed in their ſhooting; yet the number of plains meution'd, both of the column and top, is moſt certain. The places, where infinite of them may be had, are *Rainsborough Scarr* upon the *Rible*; alſo in a Stone-quarry near *Eſhton Tarne* in *Craven*.

III. *Gloſſopetra tricuſpis non-ſerrata.*

Mr. *Ray* in his Travels hath theſe words concerning the *Gloſſopetræ*, pag. 115. *Of the* Gloſſopetræ (*ſaith he*) *I have not yet heard, that there have been any found in* England; *which I do not a little wonder at, there being Sharks frequently taken upon our Coaſts.* I have had out of the Iſle of *Shepy* in the River of *Thames*, very Sharks teeth dug up there; which could not be ſaid to be petrifi'd; though, at our firſt receiving them; but they were white, and in a ſhort time came to their natural colour.

In the Stone-quarries in *Hinderskelf*-Park near *Malton*, I had this ſtone (the ſcheme whereof I ſend you;) the greateſt rarity of this kind I ever met with, and which I took out of the rock there my ſelf. It is a fair *Gloſſopetra* with 3 points, of a black liver-colour, and ſmooth; its edges are not ſerreate; its *baſis* is (like the true teeth) of a rugged ſubſtance; it is carved round, the *baſis* with imboſſed work: It hath certain emiuent ridges or lines like rays drawn from the *baſis* to each point.

IV. *Of certain* Dactili Idæi, *or the true* Lapides Judaici, *for* kind *found with us.*

The Stones call'd *Dactili Idæi* and *Lapides Judaici*, are brought over to us from beyond Seas in divers ſhades

ſhapes; and ſome of them are deſcribed in Authors. We have plenty of them for *kind* in theſe parts, as in the Stone-qurries at *Newton* near *Hemſley*, and at *Hellingley* by *Malton*. There is ſome variety in the figure of them here alſo; but the moſt common one in theſe rocks is after the faſhion of a *Date-ſtone*, round and long, about an inch, and ſometime longer. They are a little ſwelled in the middle, and narrower towards each end: They are channelled the length-way, and upon the ridges knotted or purled all over with ſmall knots, ſet in a quincunx-order. The inward ſubſtance is a white opaque Sparr, and breaks ſmooth like a flint; not at all hollow in the middle, as are the *Belemnites*.

V. *Of the Electrical power of Stones in relation to a Vegetable Roſin.*

It ſo hapned, that having occaſion in *July* to view certain Foſſils, which I had diſpos'd of into divers Drawers in a Cabinet made of *Barmondos Cedar*, I obſerv'd many of the ſtones to be thick-cover'd over with a liquid Roſin like Venice Turpentine. Examining further, there was not a Drawer, wherein there was not ſome more ſome fewer ſtones thus drenched.

That this could be no miſtake, as from dropping, the bottoms of the Drawers are of Oak. Again, many ſtones, which were lapped up in papers, were yet wholly infected and cover'd with this Roſin. Beſides, after diligent ſearch there appear'd no manner of exudation in any part of the Cabinet.

Two thing, I thought very remarkable; 1. That of the many ſorts of Stones I therein had, divers eſcaped, but not any of the *Hæmatites*-kind; having therein *Manganes*, *Sciſtos*, *Botryides*, &c. which were all deeply concern'd. 2. That amongſt perhaps 500 pieces, of the *Aſtroites* here and there one or two in an appartment, and ſometimes more, were ſeiſed, and the reſt dry;

as it fares with people in the time of the Plague in one and the ſame houſe. I further obſerved, that ſtones of a ſoft and open grain, as well as thoſe of a hard and poliſh't *ſuperficies*, were concern'd in a manner alike.

'Tis certain, that the whole body of the Turpentine of the Cedar-wood was carried forth into the Air, and floating therein was again condenſed into its own proper form upon theſe ſtones.

This makes it more than probable, that Odoriferous bodies emit and ſpend their very ſubſtance. Thus *Camphir* is ſaid, if not well ſecured, totally to fly away. Again, it is hence evident, that there is great difference betwixt the *Diſtillation* of Vegetable Juyces, and the *Emiſſion* of Effluviums or this *natural* Diſtillation; *that* really ſeparating and dividing the ſubſtance into different parts; but *this* carrying out the whole entirely and un-alter'd in its nature.

VI. *Of the Flowers and Seed of Muſhroms.*

The general received opinion of *Botaniſts* concerning *Muſhroms* is that, which *Caſpar Bauhinus* in his *Pinax* expreſſes in theſe few words, *viz. Fungi neq; plantæ, neq; radices, neq; flores, neq; ſemina ſunt; ſed nihil aliud quàm terræ, arborum, lignorum putridorum, aliarumque, putrilaginum humiditates ſuperfluæ.* I am of the opinion, that they are Plants of their own kind, and have more than a chance original. We will inſtance B. The texture of the Gills is like a paper prickt full of pin-holes. In *Auguſt* this is very frequent under hedges and in the middle of the Moors in many places of this Country. It ſeems to me (and, no doubt, it will to any perſon that ſhall well examine it, (that the Gills of this Muſhrom, are the very flower and ſeeds of this Plant. When it is ripe, the Gills here are eaſily ſeperated from the reſt of the head: Each ſeed is diſtinct from other, and hath its impreſſion in the head of the Muſhrom,

juſt as the ſeeds of an Artichoak hath in the bottom of it. The bigger end of the ſeed is full and round; and they are diſpoſed in a ſpiral order juſt as thoſe of the Artichoak. The like we do think of all other Muſhroms, however differently figured.

And if it ſhall happen to him that ſhall ſow them, that theſe will not produce their kind, but be ſteril; it is no ſtrange thing amongſt Plants, there being whole genus's of Plants that come up, and flower, and ſeed, and yet their ſeed was never known to produce Plants of their kind, being naturally ſteril, and a volatil duſt, as all the *Orchides* or *Bee-flowers*.

We ſhall not here omit to tell you further concerning this Muſhrom, that, when freſh gather'd, it is of a buff-colour inſide outſide; and yet, cut through the middle, it will in a moment change from a pale-yellow to a deep purple or blew, and ſtain linnen accordingly. A drop of the juyce, leiſurely ſqueezed out, will change, holding it betwixt your eye and the light, through all the colours of the Rainbow, in the time of its falling, and fix in a purple, as it doth in the ſpringing out of its veins.

VII. *Of the ſpeedy* Vitrifying *of the whole body of* Antimony *by* Cawk.

The ſeveral vitrifications of *Antimony* are either opaque or tranſparent. To the firſt kind I ſhall add one, which is in it ſelf very curious, and hath theſe advantages above the reſt, that it is done with great eaſe and ſpeed; and by it I have performed ſome things upon Minerals and Mettals, which with crude Antimony alone I could not effect.

Take of Antimony one pound; flux it clear: Have an ounce or two of the Cawk-ſtone (by and by to be diſcribed) in a lump red-hot in readineſs. Put it into the Crucible to the Antimony; continue the flux a few minutes: Caſt it into a clean and not greaſed Mortar,

tar, decanting the melted liquor from the Cawk.

This Proceſs gives us above 15 ounces of *vitrum* of *Antimony*, like poliſh't Steel, and as bright as the moſt refined Quickſilver. The Cawk ſeems not to be diminiſh't in its weight, but rather increaſed; nor will be brought incorporate with the Antimony, though flux't in a ſtrong blaſt.

This Cawk-ſtone is a very odd Mineral, and I always looked upon it to be much a kin to the white milky Mineral juyces, I formerly ſent you a *ſpecimen* of: And this Experiment is demonſtrative, that I was not miſtaken; for, the milky juyce of the Lead-Mines vitrifies the whole body of Antimony in like manner.

That this Vitrification is from the *proper* nature of Cawk, I little doubt; for, I could never light upon any one Mineral ſubſtance, which had any ſuch effect upon Antimony; and I have tryed very many *Lapis Calaminaris*, Stone-Sulphur; or *Sulphur vivum*, *Galactites*, *Sulphur Marcaſite*, *Allom-glebe*, divers *Sparrs*, &c.

Cawk is a ponderous white ſtone, found in the Lead-Mines; it will draw a white line like Chawk or the *Galactites*: And though it be ſo free yet it is more firm, and hath a ſmooth and ſhining grain, Sparr-like, yet not at all tranſparent. Of the Spirit, it yields by diſtillation, and the uſe that may be made of it, For caſting of *Speculums* without other mixture, another time. I am,

*York*, Novemb. 20. 1674. Sir, Your, *&c.*

## *Of the* Aſtroites, *or* Srar-ſtones *Jan.* 19 1673.

SIR, You are pleaſed to tell me, that my Notes concerning certain Stones figured like Plants, found in the mountains of *Carven*, were well received *. This encourages me to give you the trouble of what I have obſerv'd of the *Aſtroites*; which

*See N. 100. of theſe Tracts.

which are ſtones alſo jointed like the other, but not found, that I know of, in the ſame Rocks. And we muſt croſs the plain Country, and ſeek for them hard under the *York-ſhire* Woolds: For, what ſtore I could porcure of them, were brought me from *Bugthorp* and *Leppington*. At the fromer place, my ſelf have ſeen them dugg out of a certain *blew clay* on the banks a of ſmal rivulet, betwixt the Town and the Woolds. There are plenty of them waſhed into the brook; but the moſt fair and ſolid are thoſe we get out of the Clay.

I pretend not, to diſcover to you their Original, no more than I did of the *Entrochi*; but having uſed ſome diligence in cauſing the places, where they are found, to be a little more ſearched than is uſual, I was by that means furniſh't with a good quantity of them; which gave me the opportunity to make the following Obſervations. What light may be hence had, I leave to more judicious perſons, acknowledging my ſelf at perſent not to be able to demonſtrate (if they are not Stones of their own kind,) what they have been before petrification.

It is very little and inconſiderable, what any Author, that I have yet ſeen, hath ſaid of them; ſave a very brief deſcription of them in *Geſner*, and the like in *Wormius*; in the reſt, all is tranſcribed.

The Matter and ſubſtance of theſe Stones, if broken, is flint-like of a dark ſhining poliſure; but much ſofter, and eaſily corroded by an acid *Menſtrum*. † (a) Vinegar indeed, makes them creep; but a ſtronger ſpirit, as of Niter, toſſes them. I doubt not, but they will readily calcine, as the *Belemnites*, to a very ſtrong and white Lime.

Theſe Stones (as we now find them) are all *Fragments*; as we have noted of the *Entrochi*: Either one ſingle joint, or 2, 3, or more joints ſet together, making a pentagonous Cylindrical figure or five-ſided column.

And I have not yet had any piece much above one inch long, which conſiſted of 18 joints; but I have ſeen one piece, ſomewhat ſhorter than the former, which had 25 joints. Theſe laſt thin-jointed pieces are quite of a different make, as to all circumſtances, from the other, as will appear.

Every joint conſiſts of 5 Angles, which are *either* drawn out and ſharp, and conſquently the ſides of theſe pieces, made up of ſuch joints, are deep-channeled; (and this is the condition of ſome of the thick-jointed pieces, as well as of all the thin-jointed ones;) *or* the Angles are blunt and round, and the ſides plain or very little hollowed. There are as big, and as ſmal pieces of this ſort, as of any other more ſharp-angled; and therefore I account them a 3d. ſpecies of *Star-ſtones*. And of this ſort was, I gueſs, that piece which *Wormius* deſcribes; which therefore, he ſaith, is more like the blown Flower of *Pentaphyllum*, than a *Star*. Beſides, the manner of the engraving of the joints in every one of the 3 reſpective ſpecies is alſo very different, as will be declared.

Where the joints are thin or deep, they are *ſo* equally throughout the whole piece; yet there are ſome, but very few, exceptions to this alſo, of pieces which conſiſt of joints of theunequal thickneſs. Many of thick-jointed pieces have certain joints a thought broader, or a very litle ſtanding out at the Angles, and thereby the joints are diſtinguiſh't into certain Conjugations of 2, 3, or more joints: And theſe Conjugations are very obſervable in the thin-jointed ſtones, and are marked out with a ſete of Wyers; of which by and by.

The thickeſt piece, which hath yet come to my hands, is not above one inch and a half about, and thoſe very rare too: From which ſize to that of a ſmal pin, I have all the intermediat proportions; and theſe ſo exceeding ſmal pieces are as exactly ſhaped, as the greateſt. Moſt

peices,

peices, if not all, of any conſiderable length, are not ſtraight, but viſibly bent and inclining. All the pieces of any ſort are much of an equal thickneſs, or but little tapering; yet one of the ends, by reaſon of a Top-joint, is viſibly the thickeſt.

This Top joint hath 5 blunt Angles, and is not hatched or engraven, or but very faintly, on the outſide. Every joint elſe of a piece (ſave the top joint) is an *Intaglia*, and deedly engraven on both ſides alike; and will accordingly ſerve for a Seal. The middle of each angle is hollow, and the edges of the angles are thick furrowed: The terminations of theſe hatchings are the indented ſutures, by which the joints are ſet together; the ridges of one joint being alternately ſet into the furrows of the other next it. The Hatchings of the flat-ſided pieces are in circular lines; but of the other two ſpecies, they are ſtraight lines, or near the matter.

In the very center of the 5 angles is a ſmal hole, conſpicuous in moſt joints. Note alſo, that in the middle of each joint, betwixt angle and angle; in very future, is another ſuch like ſmal pin-hole very apparent, if the ſtones be firſt well ſcoured.

Beſides all the former particulars, there may be obſerv'd, in the deep-jointed pieces, juſt under the top-joint, above diſcribed, the *Veſtigia* of certain Wyers rather than branches; and ſometimes 2, 3, or more of the joints of the Wyers yet adhering. Theſe Wyers are ever *five* in number, viz. one in the middle or hollow part betwixt angle and angle. Again *in thin*-jointed pieces there are ever *five* of theſe Wyers, or a *ſett* of them inſerted into every conjugation of joints; ſo that it were ſome repreſentation of the thing, to imagine the ſtalk of *Aſperula* or *Equiſetum*. Alſo I have ſeen, but that very rarely, (not in one peice amongſt 500,) a ſett of Wyers in the middle of a *deep*-jointed piece. One thin-jointed piece I have by me, where a Wyer

of 20 joints and upwards ( and how much longer they may be, I know not, ) lyes double within the hollow ſide, and by that accident was preſerved in its natural place. Further, ſome lumps of Quarry I have from the ſame place above-nam'd, where the Wyers as well as the Stones themſelves are ſeen in long pieces. It is no wonder, that theſe Wyers are knocked off, and but very rarely found adhering to the Stones they belong to, being very ſmall and ſlender, of a round figure and ſmooth-jointed, being ſett together *per harmoniam* and not indented ſuture. Nothing that I can think of, is ſo like theſe Wyers, as the *antennæ* of Lobſters. Laſtly, ſome of theſe Wyers are knotted, and others of them ſarely ſubdivided or branched.

I have, by the aſſiſtance of Mr. *Lodge*, illuſtrated all theſe particulars with *Figures*: Of which this is the Explication;

1. The Top-joint of an *Aſtroites*, figur'd on both ſides; on the one it is deep engraven, on the other the hatches are ſcarce viſible. Alſo the ends of the 5 Angles are very blunt.

2. A ſecond or ſharp-angled joint with fair hatchings on both ſides.

3. A piece with very narrow and ſharp angles. Alſo the Top-joint deſigned, as it naturally appears ſmooth and without hatchings.

4. A round-angled joint.

5. A flat-ſided piece; where the hatchings are ſomewhat Circular.

6. A thin-jointed piece: Where note alſo, that the angles are much narrower, and of a protracted Oval figure.

7. The biggeſt piece I have yet ſeen. Note alſo its bending.

8. The ſmalleſt piece I have yet met with.

9. The longeſt piece; where every 4th joint is a thought

thought bigger or more prominent than the reſt; as in the 7th fig. alſo is well deſigned.

10. A large and round-angled or flat-ſided piece; to which belongs that ſingle joint noted fig. 4.

11. A flat or not hollow-ſided piece; of which ſort alſo is the 5th figure: The 10th and 4th not much differing.

12. A thin-jointed piece; where the conjugations are marked out by the *veſtigia* of the ſeveral ſets of Wyers or branches.

13. A piece where the joints are un-equal in thickneſs.

14. A piece with ſome part of the Wyers yet adhering in their natural order at the biggeſt end of the piece.

15. A thin-jointed; where note on the left ſide a ſingle Wyer accidentally preſerved in its natural place, though ſnapt aſunder.

16. A thick-jointed piece with a ſet of Wyrs in the middle of it.

17. A good long piece of a Wyer, and a ſingle joint thereof.

† (a) *I have ſaid the ſame thing above of the* Entrochi, *and it is true of all other ſtones in ſmall Fragments, which vinegar, or a ſtronger ſpirit will diſſolve: but I neither ſay here nor there* (Phi: Tran. *Num.* 100) *that any ſort of ſtone whatſoever will make an ebullition with vinegar, as* Dr. Grew (*Muſæ.* R.S. p: 273.) *would have me, and I admire how he could fancy ſuch a thing from my words, which are as plain and fairly limited, as can poſſiblie be writ: I appeal to the paſſage.*

*Of the Vomiting of ſtrange* Worms, *Philoſophical Tranſactions. Numb.* 117.

A Son of Mr *B.* living not far from *Rippon*, about nine years of age, in the month of *February* laſt was afflicted with great pain in his Stomach, and con-

of Wine, to preserve it in its true shape. These Worms
were very Caterpillar with fourteen legs, viz. six small
pointed, the eight middle humps; and the tail like a
a Ducks-quill, thin haired or rather naked, with brown
streaks and a black head. The very same sort kind that
I have many times seen on Plums, and no doubt, these
(as those before) would in due time (if the place had
not hindered) have turned into *Chrysalis*'s, and changed
into Flies.

*A Letter containing an account of Antiquities, &c. Philosophical Collections. Numb.* 4.

IN turning over my Papers, I found Notes of some-
thing I formerly writ to *Mr. Oldenburg*, and which
I believed was lost; it being sent much about the time
of my death. They relate to certain Antiquities, which
have (for ought I know) escaped the more curious view-
ers of this and the following, when that Study was
much more in vogue. But we shall treat of them here
only in the relation they may have to the advancement
of Natural Philosophy and Arts.

*Roman Urnes* are found in very many places
throughout the whole Kingdom; but the different work-
manship of their Vessels, their composition, and places
where they stand in them, have been little that I know
of taken notice of by any. I have observed what fol-
lows of their manner.

These Urnes are found at *York*, in the road or *Roman-*
*gate* without *Micklegate*; and [illegible] by the River
[illegible]

side, where the Brick Kilns now are. Urnes of three different tempers, *viz.*

1. Of a bluish grey colour, having a great quantity of coarse Sand wrought in with the Clay.

2. Others of the same colour, having either a very fine sand mixt with it full of *Mica*, or Carsilver, or made of clay naturally sandy.

3. Red Urnes of fine Clay, with little or no Sand in it. These Pots are quite throughout of a Red colour like fine Bole. Also many of these red pots are elegantly adorned with Figures in Basso Relievo, and usually the Workmans name, which I think others have mistaken [ *Burton's C. Ant. It.* p. 183, 230. ] for the persons name buried therein, upon the bottom or cover; as *Januarius* and such like; but that very name I have seen upon several red Pots, found both here and at *Aldborough*. After all, these are glazed inside and outside with a kind of Varnish of a bright Coral colour.

The composition of the first sort of Pots, did first give me occasion to discover the places where they were made: The one about the midway betwixt *Wetherfosse* and *Earnbie* on the *More*, Six miles from *York* in the Sand-Hills, or rising grounds, where now the Warren is. The other *Roman* Pottery on the Sand-Hills at *Santon*, not far off *Brigg* in *Lincolnshire*. In the first place I have found widely up and down broken pieces of Urnes, Slagg, and Cinders. At the latter place there are yet remaining, (though it is a moveable Sand, and hurried every way by the Wind, and has by that means covered the places all over) some of the very Furnaces, whose ruins I take to be some of those *mere* or sandy Hillocks. Besides here are many pieces of Pots and Urnes of different shapes, and much Slagg and Cinders. This Potterie having taken up much Ground, as to one that shall diligently view the place, it will appear. It remarkable, that both the above mentioned Potteries are

are within leſs than a mile of the *Roman Road*, or *Military-high-way*. Nothing is remembred in either of thoſe places, of any Pottery that was known in thoſe parts, nor indeed could I learn where any good clay for that purpoſe was to be had near thoſe Sands: which yet our modern Potteries chiefly ſeek after, which has made them to be forgotten and diſuſed; The materials of our modern Pots being much altered, and conſequently the places.

The *Roman* Urns above diſcribed differ in theſe particulars, from what Pots are now uſually made amongſt us. (1) That they are without all manner of glazing with lead, which perhaps is a Modern invention. (2.) That a far greater quantity of Sand is uſed than clay, which thing alone made it worth their while, to bring their clay to the *Sand-Hills*. (3) That they were baked either with more leiſure after long and through drying, or immoderate contact of the Flames: which I am induced to believe, becauſe there ſeem to be fragments of ſuch things to be found. 'Tis certain the natural colour of the Clay is not altered by burning: So that both the degrees of heat and manner of burning might be different. And one of theſe Potſherds as I have tried, baked over again in our Ovens, will become red. As to the two laſt kind of Urns, its likely the firſt of them with their particles of *Mica* in it, were made of a ſandy blue Clay, of which nature there is good plenty among the Weſtern Mountains of *Yorkſhire*, and particularly at *Carleton* in *Oatley* Pariſh not far off *Ickley* a *Roman* ſtation. The red Urns ſeem to have been their Maſter-piece, wherein they ſhewed the greateſt Art, and ſeemed to glory moſt, and to eternize their names on them. I have ſeen great varieties of Embоſſed work on them. And laſtly for the elegant manner of glazing, it is far neater indeed, and more durable than our modern way of Leading, which is apt

to

to crack and craſe, both with wet and heat: and at the fire is certainly unwholſome, by reaſon of the fumes Lead uſually emits, being a quick vaporable Metal. This ancient glazing ſeems to have been done by the Bruſh, or dipping; for both inſide as well as outſide of the Urn are glazed, and that before the Baking. And ſomething of the Materials of it ſeems to be remembred by *Pliny Lib.* 36. *C.* 19. *Fictilia ex bitumine Inſcripta non delentur.* The Painting of Pots with bitumen is indelible. And again, *Tingi ſolidas ex bitumine Statuas. lib.* 35. *c.* 15. The bitumen he ſayes ſinks into the very Stones and Pots, which is ſomething more than glazing.

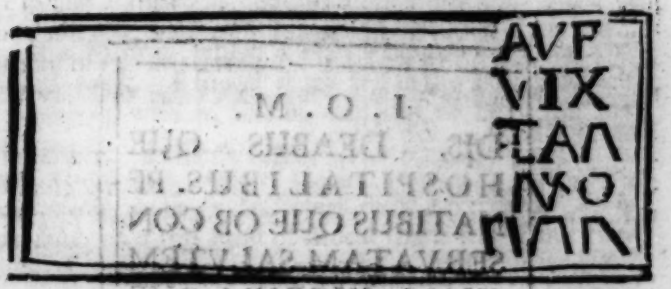
The great plenty of theſe Urns found in many parts of *England* ſeems to argue them alſo of *Engliſh* Manufacture, but where I cannot gueſs, unleſs wrought at the Bole Mines (of which Clay alone they ſeem to be made) in *Cleveland*; for that that barren tract of Land, called *Blackmoor*, was well known to the *Romans*, the Jet Rings taken up withtheſe *Urns* doth ſufficiently teſtifie. Now Bole and Jet are no where that I know of to be found with us in *England* but in that Tract; beings Foſſils peculiar to thoſe Mountains. Of theſe Jet Rings ſome are plain, and others wrought, but all of them of an extraordinary bigneſs, being at leaſt three Inches diameter, and yet the inward bore is not above an inch and an half, which makes them too little for the Wriſts of any Man, as they are much too big for the Fingers, ſo that probably they were never worn either as *Armilla* or *Anuli*. One of each ſort I have by me, which I carefully redeemed of the Workman, beſides many others which were broken, found about a ſort of Urns in *York* fields. And ſince we are upon the ſubject of Plaſticks, or the *Roman* Clay-work, we cannot but take notice of the opinion of *Cambden*;

Who will have the Obelisks at *Burrow-Briggs* in this County Artificial, when in truth they are nothing less, being made of a course Rag, or Millstone grit; but without doubt, the bigness of the Stone surprized him, either not thinking them portable, or perhaps not any *English* rock, fit to yield natural Stones of that magnitude: But *Roman* Monuments I suppose none doubt them, because pitched here by a very remarkable and known *Roman* station, *Isurium*.

And then consider what trifles these are, compared with the least obelisks at *Rome*. And as to the Rocks whence they might be hewn, there are many of that Stone near the River *Nid*, and upon the Forest of *Knaresborough*; and a little above *Ickly*, (another *Roman* station) within fifteen miles of *Burrow-Briggs* there is one solid Bed of this very Stone, whose perpendicular depth only will yield obelisks, at least thirty foot long. And yet at *Redstone* near *Burlington* in the *York-shire* Woolds, full forty miles wide of these Quarries, is an obelisk of the very same Stone, shape and magnitude of these before mentioned. But we cannot let this pass without noting, That almost all the Monuments of the *Romans* with us were of this sort of Stone; As the ancient walls of this City, as appears by what remains of the ancient Gates, and the great quantities of it that is wrought up in most of the Churches, and is still daily dug out of Foundations: But a most undeniable instance is, a vast *Roman* head, perhaps of some of the Emperors, upon a neck or square to pedestal of one solid Stone, with the point of the square to the eye, of as course a grit as that of the Obelisks above mentioned. This Stone is now in *Mr. Hilliards* Garden, and was dugg out of the Foundations of some Houses thereabouts. The only remaining Inscription that I could find at *Burrow-briggs*, yet imperfect as well as odde, is

upon

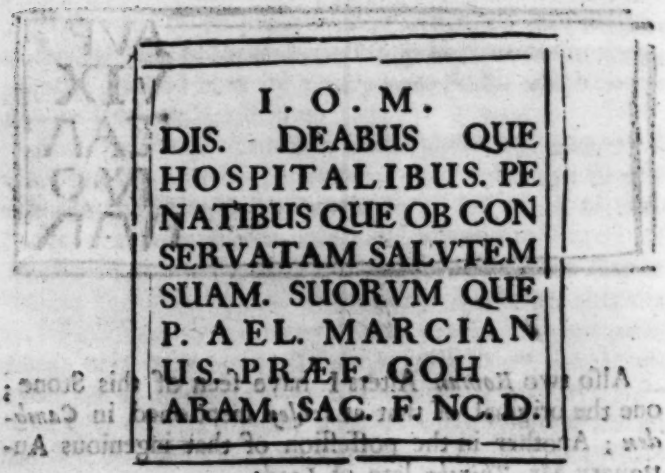
upon this sort of Stone in the Street Wall of Sir *William Tankards* House.




Also two *Roman* Alters I have seen of this Stone; one the original of that at *Ilkley* mentioned in *Cambden*; Another in the possession of that ingenious Antiquary Mr. *Thirsby* late of *Leeds*.

And this I think sufficient to disprove that mistake of *Cambden*, That the Stones at *Burrow-briggs* are artificial. There is but one only instance that I ever yet met with of the *Romans* ever having used in these parts of *England* any other sort of Stone; yet is it not the common lime stone, but a certain Stone had from the Quarries about *Malton*, because of the *Lapides Judaici*, by me formerly described to be seen in the texture of it. It is a small but elegant Alter with Figures in *Basso Relievo*, of Sacrificing instruments, *&c.* It has suffered an unlucky accident by the stupid ignorance of the Masons, who were ordered by the late

Lord *Fairfax* to place it upon a Pedestal in the Court of his House at YORK. Yet the Inscription which they had miserably defaced, was by chance preserved.



*An account of a Monstrous Animal cast out of the Stomach by Vomit*; Phi: Coll. *Num.* 6.

*SIR*,

I Send you (here inclosed) the true and exact shape of a Worm, which a man Vomited up here the last week. I found it my self in the Blood, which came up with it, having caused it to be washt for the more careful examination of it, much of the Blood, being clods of a kind of skinny and fleshy substance, *Haud aliter, quàm in Mulierum molis excernendis accidere solet.* Of this kind of Blood there was about two pound weight saved in the washing, and this odd Animal amongst it; which was easily discovered by me, being of a *dark green* colour like a Horse-Leech, and spotted not unlike some of them. I could perceive (when I found it) no life or motion it had; the Girle that washed the Blood having almost beaten off a Finn, and part of one of the forks of the Tail; and burst the belly of it; yet it was curiously and regularly shaped in all its members, as is fully expresst by the paint of a most excellent Artist, who Limned it by the thing it self, not two hours after I had it under my eye, that nothing might be added, but what was very true and natural. The Spirit of Wine in which I put it, has altogether changed it as to its colour: but yet it still remains perfect enough to satisfie any curious person.

This honest man, a Baker, imagined he drank it the last Summer in pond water; of which he was used to drink after sore labour in his calling. This is certain, he had about his Stomach and right side a most exquisite and tormenting pain, for at least four Months last past; which many times threw him into horrours and chillness, ague-like; and indeed when he vomited this up, he was the sickest man I ever saw not to dye: He also

voided Blood by Stool ſeveral dayes alſo, and now I do believe, he will recover, although his pains are not wholly ceaſed.

To ſay what this Creature is, I dare ſcarce venture. You know how long I have made it my diverſion to ſearch into the nature of *Inſects*, and it is no ſmall progreſs I have made therein, yet I am at a loſs where to place this Animal; for that it is not like any thing I ever yet ſaw in Nature: However it makes me give more credit than I did to ſeveral ſtories of a like nature which we frequently meet with in *Medical Hiſtory*, and thoſe recorded as very truths by ſober, learned and induſtrious perſons. But though I now believe there was much truth in moſt of them, yet I fear little care was taken to deſcribe exactly the Animals, otherwiſe than by memory, either in reſpect of the words or painting, which has gone a great way in rendring all ſuch ſtories uſeleſs and and ridiculous.

This Animal was about four inches long, and in the thickeſt place three Inches about; it had three Finns of a ſide, all near the head, and the upper pair moſt exactly and elegantly figured, as is deſcribed; all theſe Finns were thick and fleſhy: but the forked Tail was finny and tranſparent, and to be extended; it was placed *horizontally*, not as that of moſt, (if not all) ſmall Fiſh, and even Neuts and Tadpoles or Froggs in diſguiſe, in which particular it differs from them all, as well as in the fleſhineſs of the Finns.

Beſides this odd Animal I found the *head of another* of a different ſhape, as is expreſt; but of a dark green colour alſo as the other: the body of it had not been loſt, or this other ſo ill treated, if I had expected to have found, what we never looked for.

But what ſhall we ſay this Monſter was? give me leave to ſpeak my mind without prejudice, and with ſub-

ſubmiſſion to the better Sentiments of the Honourable and Learned Society: I am apt to think (and I believe few will deny it me) that we often drink and eat what is alive; and it is certain ſome things will live on in our Stomacks in deſpight of concoction; not to inſtance in the many ſorts of Gut-worms natural to us, and which are bred with us, perhaps in ſome Children even before they are born; theſe Worms I ſay, do freely wander up and down the Guts and Stomach at pleaſure, and receive no prejudice from the concoctive faculty of them: And for this reaſon we ſee *Inſectivorous* Birds ſo ſolicitous to kill Worms and all other ſorts of Inſects, by drawing them again and again through their Bills as Canes through a Sugar-Mill, that they may be verily dead before they ſwallowed them, and *inſtinct is the great wiſdom of undebauched nature*: Again, admirable inſtances there are of Animals living within Animals; of which in the Inſect kind, the Royal Society ſhall ere long receive ſome notes of mine upon *Godartius*. And yet I am of the mind that what was accidentally ſwallowed by us alive, and that ſhall have the power to live on within us, (eſpecially if it ſhall be young and tender, and yet growing) may have its deſigned form and ſhape monſtrouſly perverted, ſo as to appear to us quite another thing than naturally and really it is; and this I take to be the caſe of this odd Creature, the preſent ſubject of our Diſcourſe: and ſo this might have been the Spawn or Embryo of a Toad or Neut.

But we muſt alſo account for the much fleſhy ſubſtance or ſhinny lumps of Blood vomited up with it, which I think eaſily intelligible thus; That that Spawn or *Embryo* of a Toad or Neut might well venome the Stomach or Gut, in which part ſoever or wrinkle thereof it chanced firſt to reſt or ſtick, and cauſe an inflam-

mation

mation there, and ſo have it ſelf ſwelled aud cloſed up within a Tumour of its own making, which in proceſs of time might gather to this bigneſs, and at length burſt in pieces and come up together.

Familiar and infinite inſtances of this nature, we ſee in By-fruits or Wens which Inſects raiſe upon Vegetables; which by natural inſtinct know how to invenome a Plant, and ſo *compendiouſly* to provide both food and houſing for their young.

*YORK*,
*March* 1681.

*An Account of a* Roman Monument *found in the* Biſhoprick *of* Durham, *and of ſome* Roman *Antiquities at* York, *Phil. Tran. N.* 145.

I Have with much trouble got into my hands a Piece of *Roman Antiquity*, which was but a very few years ago diſcovered upon the South Bank of the River *Tine*, near the *Sheilds* in *Biſhoprick*. It is a very large and fair *Roman Alter* of one entire Stone. But after all my coſt and pains, I am ſorry to find the Inſcription very ill defaced, that much of it is not legible. And I believe it hath been miſ-handled by thoſe who endeavoured to read it; whereas if the remainder of the Letters had been exactly meaſured, and the face blackt and lightly waſht off again, as in Prints, ſome things more might have been ſpelled.

As to the nature of the Stone it ſelf, it is of a courſe *Rag*, the ſame of that with that of the *Pyramids* at *Burrow-Briggs*. It is 4 foot high, and was aſcended to by ſteps, which appeareth, in that all the ſides, but the Front, have two ſquare holes neare the bottome, which let in the Irons that joyn'd it to the Steps.

I have

I have carefully deſcribed it in all it's ſides, and have given the Plane of the Top alſo; which if you pleaſe we will ſurvey in order.

1. The Back-ſide, oppoſite to the Inſcription; on which is Ingraven in Baſſe-reliefe, a *Flower pot* furniſhed, I ſuppoſe with what pleaſed the Stone-cutter, for theſe men need not to be more curious than the Prieſts themſelves, who were wont to make uſe of the Herbs next hand to adorne the Alters. and therefore *Verbena* is put for any kind of Herb. Yet if we will have it reſemble any thing with us, I think it is moſt like, if not truly *Nymphæa*, a known and common River Plant.

2. One of the ſides, which is ſomewhat narrower than the Front or Back: On this are Engraved in Baſſ-relieve, the *cutting-knife* (*ceſeſpita*) and the *Ax* (*ſecuris*). The Knife is exactly the ſame with that on the other Alter formerly by me mentioned in the Philoſophical Collections of Mr. *Hook*; but the *Ax* is different; for here it is headed with a long and crooked point, and there the head of the *Ax* is divided into 3 points.

3. The other ſide; on which are engraved after the ſame manner an *Ewre* (*Urceolus*) and a *Ladle*, which ſerve for a *Sympullum*. This I call rather a *Ladle*, than a *Mallet*, it being perfectly Diſh-wiſe and hollow in the middle, altho *Camden* is of an other opinion in that elegant *Sculpt* of the *Cumberland* Alter, And the very ſame Utenſil I have ſeen and noted on the *Ickley* Altar, which is yet extant at *Middleton Grange* near that Town; but the Stone which *Cambden* ſaies ſupports a pair of Stairs there (as at this day it does in the very Road) is but an ill Copy of it, and not the Original.

4. The Plane of the Top; which is cut in the Figure of a *Baſon* (*diſcus* or *lanx*,) with *anſæ* on each ſide, conſiſting of a pair of links of a chain, which reſt upon, and fall over two Rowles; And this was the *Harth*.

5. The Front; which hath an Inſcription of nine lines in Roman Letters, each Letter a very little more than two inches deep of our meaſure; now remaining as in the prefixt Sculpture, *Fig.* 5. which I would read thus, *Dis deabuſq; Matribus pro Salute M. Aurelii Antonini Auguſti Imperatoris — votum ſolvit lubens meritò ob reditum.*

The *Deæ Matres* are well interpretted by *Selden.* It is much his Safety and Return both vowed, ſhould be ſo ſeperated in the Inſcription; but I have not *Gruter* by me to compare this with the like. *Caracalla* ſay the Hiſtorians * after his Fathers death at *York*, took upon him the Command of the Army alone, and the whole Empire; he went alone againſt the Enemie, who were the *Caledonij* inhabiting beyond the Wall, which his Father had built, he made Peace with them, received their Hoſtages, ſlighted their fortified places, and returned. And this ſeems to be confirmed by the Inſcription; for undoubtedly upon this his laſt Expedition of him alone, without his Brother *Geta* and *Mother*, was this Altar erected to him alone, at a place about Two Stations on this ſide the Wall. So that the Vow might be as well underſtood of his Return from this expedition, as for his Safetie and return to *Rome*; which mi-thinks ſhould be true, or his Mother and Brother *Geta* would ſcarce have been left out, at leaſt ſo early. For yet the Army declared for them both, according to their Fathers Will.

* *Xiphilinus Herodianus &c.*

Further, it ſeems alſo to have been erected by thoſe who flatter'd him, and who were afterwards killed by him; and for this reaſon the perſons Names, who dedicated it, ſeem to me to be purpoſely defaced, the 6 and 7th Lines of the Inſcription being deſignedly cut away by the hollowneſs of them, and there not being the leaſt ſign of any Letter remaining, and this I ſuppoſe might be part of their diſgrace, as it was uſual to deface

deface and break the Statutes and Monuments of persons executed, of which this Monster made strange havoc.

But since worn Inscriptions admit of various readings, because some Letters are worn out, and some more legible, whereby not prejudiced people may conceive them diversly, I will therefore tell you an other reading of part of the two first lines, which I do not disallow, but that it will agree well enough with the History of *Severus*, tho his *Apotheosis*, or solemn deification, was not performed till he came to *Rome*, in the manner of which Funeral Pomp *Herodian* is very large; it was of that excellent Antiquarie Dr. *Johnson* of *Pomfret*

CONSERVATO
RI. B. PROS &c.
The rest as follows in mine,

Which shews the hight of Flattery of those times. So that they paid their Vowes to the lately dead Father the Conservator of *Britain*, for the safety of the Son; and the Story tells us how gladly he would have had him made a God long before, even with his own hand.

I think it not amiss, if I give you the rest of my Observations concerning these matters, which I have met with in this City.

1. A large *Pedestal* of the same sort of Stone, found deep in the ground, on the West side of the River, which by the Stone, and its mouldings, was undoubtedly *Roman*, and must have been for a Pillar in some large building.

2. A Broken Inscription in the Church-wall in *All-Saints* North-street, with the Figure of a Naked Woman in Bass-relieve on the left side of it. The Letters (as many of them as remain) are exceeding fairly cut, beyond any thing I have yet seen of *Roman* Antiquities

in *England*, and the Stone of a finer grain than ordinary. It is a Monument of *Conjugal Affection*.

The first stroak is the out-side of a great M, and is part of the *Dis Manibus*. The three last lines may be read thus, *Benè merenti Antonio Conjugi*: Yet it is hard to say, whether it was for the Husband or Wife, for it may be read *Antoniæ*. The Points also betwixt the words are here very singular, but this was the caprice of the *Stone-cutter*, who sometimes also use a Leaf, hanging or erect, a Hand, a Feather, or such odd fancy for Points.

## 2. *A Relation of a Man biten with a mad Dog, and dying of the disease called* Hydrophobia: *Philosophical Transactions.* N. 147.

I Have formerly entertained the R. S. with odd cases in Phisick; as the Stone cut from under the Tongue of a Man; of *Lumbrici teretes* found in the Ancle of a Child; of a monsterous Worm vomited, &c. And I therefore think by the kind acceptance of those, this I am about to relate of a man bit with a mad Dog, and dying of the disease called *Hydraphobia*, will be

be wellcome. It is by Gods providence that it is a rare case, for *Gallen* calls it *omnium morborum pessimus*: And since it is in that great Physitians opinion the worst of diseases, it is an extraordinary blessing to mankind that it happens so rarely; especially if we consider how infinitly fond we are of so poisonous a Creature, and what vast numbrs we keep out of meer wantonness and pleasure more then any real use or service they can do us.

*James Corton*, a very strong and well built youg man, was bit with a mad Dog in the right hand, the wound heal'd of it self, and the thing was forgotten by himself and wife; but as he said (after the disease of *Aquæ pavor* had seiz'd him, and that it was given him by me as a reason of his not drinking) he told his wife he wondred why the Dog, which used to be so familiar with him, should then bite him. But this was all forgot; And after about five or six weeks he complains of pain all over his bones, but especially his back and round about his Stomack, looks very pale, hollow eyed, &c. The third day after this complaint, *viz*, Sunday in the evening *March* 11th 1682, he called for burnt brandy, drank it, went to bed, and vomited it up: after this he had a restless night, and in the morning found himself very ill, with a strange rising in his Stomack, and though no thirst, yet an impotence to drink, and even to swallow his *Spittle*, which was death to him as he often said. *Diascordium* and a bottle of *Cordial water* was brought to him by an Apothecary that morning, The *Diascordium* he took, but was not able to drink of the *Cordial* one Spoonfull. This on Munday morning; about one a Clock that day I first saw him, and found him upon this Bed, his Pulse very slow, and sometimes unequal, but not unless frighted from the rising of his Stomack; his flesh cold, his tongue not dry, but flexable and moist, a little white. I caused him to rise off the bed, and set him full in the

light; and then because he mightily complained of I know not what sickness about his stomack, I offered him of the *Cordial*, but he starred, and trembled at the approch of it. This I exceedingly admired, whereof I called for a glass of Wine or Water, and a Tumbler of water was brought me up, which I gave him to drink; but he vehemently startled at it, and his Stomack swell'd and rise, after I knew not what odd and strange manner; and I could then find his Pulse very trembling and disturbed. I still urged him to drink; But as I put it forwards to his mouth, he the more affrighted drew back his head, and sighed, and eyed it with a most gashly look, not without Screeking and Noise. This I most mightily admired, and was at a great loss what should be the cause of this strange Symtom, when at length it providentially came into my minde, that this was *Aqua pavor*; and then I tryed him again and again to drink; and found him more disordered at the sight, especially at the drink. Wherefore I ask't his mother in Law and the Maid, who stood about him, where the wound was he last had had; at which question they seemed concerned, and replyed, they wondred what I meant. I then told them he had been bitten by a Dog; It is true (he said all in a fright,) I was bit by such a Neighbour's Dog, about five or six weeks ago, here in my hand, but it has been long well. I then bid him lye down, and so left him, calling his Wife and Mother and Friends to me below Stares, and telling them that he would certainly dye, that there was but small hopes of his recovery, it being too late; that none should be suffered to go to him but keepers, some strong man or two, &c.

I forthwith ordred a Vein to be opened in the arm which was bit, caused the wound to be scarified and drawn with *Vesicatories*, and the same Plaister to be applyed unto the neck and leggs and the inside of the arms; I ordered the usual and famed *antidotes* to be given him

as

as of *Theriaca*, *Cinis cancorum*, *Rasa*, *Agaricus*, &c. In Bolus's. For it is to be noted, that solid things in a Spoon he could take, but yet not without much trembling, and fear, and Caution, and an earnest request that no body would suddenly offer them to him, but give them into his hand gently; and then he would by degrees steal his hand softly towards his mouth, and of a suddain chop the Spoon in and swallow what was in it, *velut canis ad offam*; and this he did more greedily and readily then any other man could do. Of these antidotes in Bolus he took a Dram every hour, and alwayes in this manner, for at least a dozen times taking; and every like drink was profferred him in the night, but he could not see it without horrour, and the same motions from his Stomack. Nay he did affirm that as oft as he by chance swallowed any Spittle it went to his heart, even as tho he should dy that very Moment. This night passed wholy without any sleep or rest.

Tuesday morning I viewed his blood, which was both to the *Serum* and *Cake* well coloured, and in such proportion as is usual in healthful persons, and of good consistance.

He had now a violent Feavour upon him, and a very quick Pulse. Water was offered him by my order, but in vaine; He begging he might dye unmolested, nothing being such a terror to him as the approach of any drink; and that none might come suddenly upon him, or offer him any thing more, for all things frighted him; And that he found he must shortly dye, for that his heart began to faile him; and indeed he look'd exceeding pale and hollow and thin visag'd.

I then with much difficulty perswaded him to cast himself cross the bed upon his belly (for he had his Cloaths loosely about him) hanging his head over the other side; perswading my self that this posture might be advantagious to his drinking, since that in the erect posture

of

of a man he could not ſo much as endure the approach of liquor. In this poſture then of a Dog, he ſuffered a large Bowl filled with *ſmall Beer* to be brought under his head, and imbracing it with raptures of joy, he declared he was infinitely refreſhed with the ſmell of it; that he now ſaw it with delight, and aſſured us he ſhould be able ſoon to drink it all off. And he that now thought himſelf a dying man talked pleaſantly, and ſaid many paſſionate things to his brother, wife, &c. wonderfully extolling this invention, and thanking me for it. He endeavoured with great earneſtneſs to put down his head to it, but could not; his Stomack riſe as often as he opened his Lips; at length he put out his tongue and made towards it as tho he would lap; but ever as his tongue never ſo little touched the Surface of the beer, he ſtarted back affrighted. And yet all this while was pleaſed with the thoughts of drinking; and would not ſuffer the Maid ſervant to take it away from under his head; and if ſhe did a little withdraw it, he ſaid he followed it by the *ſmell* with delight, ſnuffing with his noſtrils. After a long time being mightily foiled, he alleadged that the faint ſmell of the *ſmall Beer* hindered him from drinking, and therefore deſired a *Bowl of Ale*; which was brought him; but after much ſtriving, and exerting his tongue a thouſand times, he could not drink of it; and lapping with great affrights, as oft as his tongue touched it he ſtarted back with his head, bringing it down again gently to the Bowl a hundred times, but all in vain. And in this poſture, what upon his belly and what upon his hands and knees, he kept himſelf at leaſt an hour thus *Tantilizing* himſelf; but it was not in his power to drink. We than gave him a *Quill* which conſiſted of two or three Joints, the one end in his mouth and the other in the liquor; but he could not manage it, nor ſuck no more than a Dog. I perſwaded him to give all over and lye down; which he did;

did; and not long after my going away, he fell into a Convulsion Fit, bit and snarl'd and catch'd at every body, and foamed at the mouth. After this was over he took an *Elleborism* in a *Bolus*, which was taken like the rest, and very willingly by him; it wrought about 3 or 4 times very plentifully, and he declared himself wonderfully at ease by it; but yet now and then fell convulsed, and then always insensible. After four hours I returned to him again, and found the *Minister* with him; he talked very sensibly to him, prayed very earnestly with him, saying the Prayers after him, and desired the *Sacrament*, which in these circumstances could not be given.

He was again solicited to drink, and he now readily enough put himself into the former posture, and with as much earnestness as ever used all the little shifts to drink, while the Bowl was under his head; but all in vain. He had a little Silver Tumbler fill'd with drink put into his hands, which suddainly, when he had as it were stolen it near his mouth, he would have thrown it into his throat, as he did the *Bolus*'s, but it hit against his teeth & fell into the Bowl. I cannot say he ever went to stool or made water all this time, and therefore had a Glyster given him; but upon parting with it, which he did immediatly almost as soon as given, he died convulsed: But his not making water, as well as a troublesome *Priapisme* which he complained of, when upon his knees, might proceed from the Blistering Plaisters, as well as from his Disease.

That nothing may be omitted which relates to this case; the day after his interment I accidentally met with his Cozen Mrs. S. who told me that her Daughter was in fear, for just that very day fortnight before his death she had been at his house, and he would go home with her to her Mothers; that she remembred his hand trembled and his body shake'd, that he was in a cold sweat, and in a great disorder, so that she asked him what

he ail'd: he told her, that after his work (for he was an Upholster) it had been of late usual with him: And which was remarkable the very Dog which bit him came at that time along with him to her Mothers house; and was alive and well at the mans death.

To this we add that Mr. *Widdow* a Mercer doth affirm, that about the very time that Mr. *Corton* was thought to be bit with *Suttons* Dog, a black Dog, which he verily believes to be the same, came and bit a Whelp of his in his Shop. The next day the Whelp ran mad up and down the House, and bit both him and the Maid; him in the hand, and the Maid in the leg, and dyed that very day. About a month after he was bit he found himself not well, and was troubled with a pain at his heart, and had a fearfulness and trembling upon him, and got no rest for three nights, upon which he had had himself blooded, and found himself better; his Maid doth not yet complain of any harm.

Thus far for matter of fact, delivered with care in all circumstances that came to my knowledge.

It is very hard to give a probable reason of this *Aquæ pavor*: what *Galen* (*de Theriaca*) says of their much coveting water, because of the *intollerable thirst* upon them, agrees not with our case. For this man was neither thirsty nor distracted, as he would have them; he was all the time in his Witts, did very well consider, and rationally discourse of the thing, and exceedingly admired at the impossibility of his drinking: was well satisfied with the Minister who told him of his incapacity of the receiving the Cup in the Sacrament; and did often say he was not thirsty, which appeared by the moisture and flexibility of his tongue, (even after his taking many hot and piperate *Antidotes*,) for this was by me even to the last carefully viewed. Besides, those who are very thirsty, and distracted in the most violent Feavers, do not only drink readily enough without dread; but on the con-

contrary have an exceeding greedy Appetite to it.

Nor can I well understand what *Julius Palmarius* (*de morbis Contagiosis*) means by the third Paroxism of an *Hydrophobia*, before which he would have his never failing Antidote to be given, which our dispensatory calls *pulvis Antilissus*; I suspect he took the disease, as he ownes he did the Medicine, upon trust; indeed it seems to me not to have many things in it of the nature of Antidotes. This our man certainly had the disease of *Aquæ pavor* upon him continually from the first Moment to his death, which was near 48 hours without any intermission; for as oft as drink was shewed him, or he swallowed his own Spittle, his disturbance was most grievous and terrible.

*Dioscorides* in this (as in all things else he treats of) is most sober, and to be credited; *Quidam, qui jam aquæ metum sentirent, sumpto Helleboro, simul ac primum morbi impetum experirentur, sanati sunt: nam & jam vitio tentatos nemo unquam servare potest.* This very well agrees with our case; The latter person who had a sense of the evil, had it prevented by bleeding; but our man which had the evil; that is the *Aquæ pavor* upon him, not bleeding, or the most famed Antidotes, or even *Hellebore* could in the least save, tho not very untimely given him.

The case indeed rarely occurs, and therefore cannot well be observed in all due circumstances in order to its clearer understanding, and consequently cure; we shall venter however to lay down some few things to salve it by.

*First*, That *J. Corton* had some of the organic parts of his body transformed into, or affected after the nature of a Dog, especially the *Gula*, *Tongue* &c; so that what was offer'd to him in the erect posture of a man was very frightful, as well as difficult for him to take, because against his *new nature*, as much as it would be for us to

get a dog to drink standing upon his hinder legs.

But yet this is not all, for when he was turned upon his belly, and would have aided the Dog, he yet could not drink; and tho' he frequently put out his tongue and lapt, yet he could not endure to take any thing into his mouth of liquor, as tho something had hindred him within.

Therefore we may imagine he was also *convulsed* in those parts, or *swelled*: but this we cannot grant, for the contrary does plainly appear, because he could cast any thing into his mouth and swallow it; as he did very many times stif *Bolus*'s, more nimbly, as to the swallow, then any man reasonably could be supposed to do, that was so weakened: for I saw no difference betwixt those he swallowed an hour or two before his death, and the very first he took.

*Secondly*, That his *Spittle was envenomed*; for as oft as he swallowed it, (his Stomack vehemently abhorring it) it went to his heart (as we say), and was even present death to him; And so liquid things coming nearer to the consistance of Spittle might the rather *movere salivam*, and therefore gave him a greater terror and difficulty to swallow, then solid things.

And that his Spittle chiefly was infected with the venome of the Dog, seems also, 1. Because the Dog bit him, whose Spittle alone to be venomous to the touch (a) there are many credible instances in Medical History. 2. He was most like a Dog in the mouth, *viz.* where are the proper Organs of the *Saliva*. 3. The bite of a man so bitten is alike infections; but otherwise innocent.

(a) *Gal. de loeis affec. lib.* 6.

But it may be aske how comes it to infect his Spittle, and not other humors and the blood. I answer, The blood in part was undoubtedly affected, as the Symptoms arising before the *Aquæ pavor* (which yet is the onely true *Pathognonick* of the disease) demonstrate. Again the blood is not *one liquor* (as is generally thought),

but

but many distinct liquors circulated together *in one set of common Vessels*; and so it might infect that liquor which it was such a thing, as the Saliva of a Dog or the *Saliva* of a man. Concerning the truth of this proposition, I have formerly made some things for you; and more I intend to entertain you with; you will excuse me at present if I do not think it convenient to prepare my Papers.

*York*, *March* 26. 1683.

## *An account of part of a* Wall, *built in the* Romans Time.

I Carefully viewing the *Antiquities* of *York*, and particularly what might relate to the *Roman Empire*; of which this place had been a seat, And the *dwelling* of at the least two of the *Emperors*, *Severus* and *Constantine*, I found a part of a *Wall*, yet standing, which is undoutedly of that time; it is the South Wall of the *Mint-Yard*, being formerly an Hospitall of S^t. *Lowrance*, looking towards the River; it consists of a Multangular Tower, which did lead to *Bootham-bar*, and about —— yards of Wall, which ran the length of *Conning-street*: As he who shall attentively view it on both sides may discerne.

But the outside Towards the River is most worth taking notice of, it is faced with a very small *Saxum quadratum* of about four Inches thick, and laid in Levells like our Moderne brick-work; This sort of building *Vitruvius* (*Lib.* 2. *Cap.* 9.) calls after the Greekes, *Ysodomum, cum omnia Coria æquâ crassitudine fuerint,*

*ſtructa*; but the length of the ſtones is not obſerved, but are as they fell out in hewing; From the Foundation twenty courſes of this ſmall ſquared Stone are layd; And over them five courſes of *Roman bricks*; Theſe bricks ſome of them are layed length-waies, and ſome end-waies in the Wall; And were called *Lateres Diatoni*.

After theſe five courſes of Bricks, other twenty two courſes of ſmall Square ſtones, as before deſcribed, are laid, which raiſe the Wall 3 Foot higher; And then five more courſes of the ſame *Roman Brick* are over laide; beyond which the Wall is imperfect and capt with modern building. Note that in all this height there is no Caſement or Loopehole, but one intire and uniforme Wall; from which we gueſs the Wall to have been built ſome courſes higher after the ſame order.

The reaſon of this order of Brick-worke intermixt with Stone the ſame *Vitruius* gives, and in this particular the *Romans* after his time, and upon his admonition, and recommendation, in all probability, did imitate the Greeks. *Longitudines coriorum* (ſaies he) *alternis coagmentis in craſſitudinem inſtruentes*, and a little] further; "*inter ponunt ſingulos perpetua Craſſitudine utraque parte* "*Frontatos* (*latcres*) *quos* Diatonos *appellant, qui maxi-* "*mè Religando confirmant parietum ſoliditatem*; Theſe Bricks were to be as *Throughs*, or as it were ſo many *new Foundations* to that which was to be Superſtructed; And to bind the two ſides together firmly; for the Wall it ſelf is only faced with ſmall ſquare ſtones; And the middle thereof filled with Morter and Pebles; *Frontibus ſerviunt* (ſaith the ſame Author) *& medio farciunt*; which *Vitruvius* diſcomends in the *Romans* of his time; And therefore the later *Romans* (the builders of our Wall) did, as I ſaid, correct this Errour, and the *Greeks*.

And leaſt it ſhould ſeem ſtrange, that Bricks ſhould give a firmneſs to Stone buildings, the ſame *Vitruvius* teſtifies

teſtifies, and therefore commends Brick building before ſtone ( our men indeed, for wholeſomeneſs, which alſo is true, and to be much conſidered in a cold and moiſt Climate) even for the duration; And therefore in *Rome* abatement was ever made for the uſe of Sone building, none for that of Brick, provide it kept its level and ſtood upright upon its Foundation; And therefore to excuſe it he at large gives a relation why the *Romans*, ſuffered not Brick buildings to be made within the City of *Rome*; as a thing not of choice, but neceſſity. Thoſe Brick buildings being certainly in that great Architects opinion to be preferred. the Law (ſayes he) ſuffers not a Wall to be made to the ſtreet ward ( for ſo give me leave to interpret *communi loco*) above a Foot and a halfe thick, and partition Walls the ſame, leaſt they ſhould take up too much rome. Now Brick Walls of a Foot and a halfe thick, ( unleſs they were *Diplinthij*, or *triplinthij* ), cannot bear up above one Story; but in ſo vaſt and Majeſtic a City ( as *Old Rome* ) there ought to be innumerable habitations; Therefore when a plain *Area*, or building of one ſtory could not receive ſuch a Multitude to dwell in the City, therefore the thing it ſelf did compell them to it, that the Houſes might be raiſed higher, and therefore they had ſtrange contrivances of out jetting, and over hanging ſtories, and Belconies, &c. Which reaſons if rightly conſidered are great miſtakes; *Our men* at this day have taught the World better things; And have demonſtrated that a firm building may be raiſed to many ſtories heighth upon a foot and a half thick wall. The overſighr of the *Romans* was the vaſt bigneſs of their Bricks; for the leſſer the Brick the firmer the worke, there being much greater firmneſs in a multitude of Angles, as muſt be produced by ſmall Brick, then in a right line; And this is the reaſon of the ſtrength of Butreſſes, and Mult-angular Towers, &c.

Theſe Bricks are about 17 Inches of our meaſure long and

and about 11 Inches broad, and two Inches and a half thick. This, (having caused severall of them to be carefully measured) I give in round Numbers, and do find them very well to agree with the notion of the *Roman* Foot, which the learned Antiquary *Greaves* has left us, *viz.* Of its being of halfe an Inch less then ours; they seem to have shrunk in the baking more in the bredth then in the length; which is but reasonable, because of its easier yeelding that way; And so, for the same reason, more in the thickness, for we suppose them to have been designed in the Mould for three *Roman* Inches.

Now that this was properly the *Roman Brick*, we have the testimony of *Vitruvius*, and *Pliny*: of *Vitruvius*, "*Jam Laterum tria genera, unum quod Graece* "*Didoron appellatur, quo nostri utuntur*, &c. And of Pliny; "*Genera eorum tria Didoron, quo utimur* "*longum sesquipede, latum pede*; But we are to note, that the Coppy of *Vitruvius*, where it describes the measure of the *Didoron* is vitious. And is to be corrected by *Pliny*; And had not *Vitruvius's* Commentatour been more a friend to his Author, than to truth, he had not perswaded the contrary; for the Bricks themselves do demonstrate at this day *Plinie's* measures to be right and not that of *Vitruvius* as they are extant: which makes me much wonder at the confidence of *Daniel Barbarus* affirming the Bricks, now to be found are all according to *Vitruvius* and not *Plinie's* measures; for all that I have yet seen with us in *England*, are of *Plinie's* measures; as at *Leister* in the *Roma* Ruine there, called the *Jews Walls*; at *St. Albons*, as I remember; and here with us at *York*.

And to goe no farther for Arguments, than that Chap. of *Vitruvius*, the *diplinthij parietes* in *Rome* were against Law, and the single Brick-wall was only allowed as Standards; *viz.* A foot and a halfe thick wall, of one *Roman* Brick a length, as was above Noted.

*Pliny*,

*Pliny*, lived some time after *Vitruvius*, and being a professed *Transcriber*, and, as it appears from this very place, having taken the whole business of Brick *Verbatim* out of him and not differing in any one thing in the whole Chapter, but in this; *viz.* in the measure of the *Didoron*; And the Bricks demonstrating the truth of that differance, it is but reasonable we should make *Vitruvius's longum pede, latum semipede*, a fault of *Vitruvius's* Coppiers.

I shall conclude this differance with this remark: That proportion and a plaine Uniformitie, even in the minutest parts of Building, is to be observed, as this miserable Ruin of *Roman* workman-ship shews: In our *Gothic Buildings* there is a totall neglect of the measure and proportion of the Courses, as tho that was not much materiall to the beauty of the whole, whereas, indeed, in *Natures works*, It is from the *Symmetrie* of the very *Graine*, whence ariseth much of the beauty of the thing. Indeed, if I was never to come nearer a building, and to view it alwayes at such a distance, this might be excused as to me; And so in *Artificiall things*, as in Pictures, and Carvings to be seen on high: But yet in my opinion 'tis but an excuse of Lazines to tell me such and such rude dashes will have a marvelous effect at a distance; as though things Painted or Carved to addorn our comparatively low Roomes were distanced. And this *Noble Art*, in my opinion, has of late in nothing suffered so much with us as in admitting of this vile (*not to say Impudent*) Excuse, whereas indeed, What is well done and most exactly finished in the most minute parts of a thing Painted? I am sure if it pleaseth me near the Eye, it will never displease me at a distance.

25 Cochlea terrestris turbinata et striata fab Col.

A

25

27 $\frac{1}{2}$

x

14

Call. Nar.
Aldernensi Insula.
A. Wallia Flord.

14. Buccinum exiguum fasciatum et radiatum.

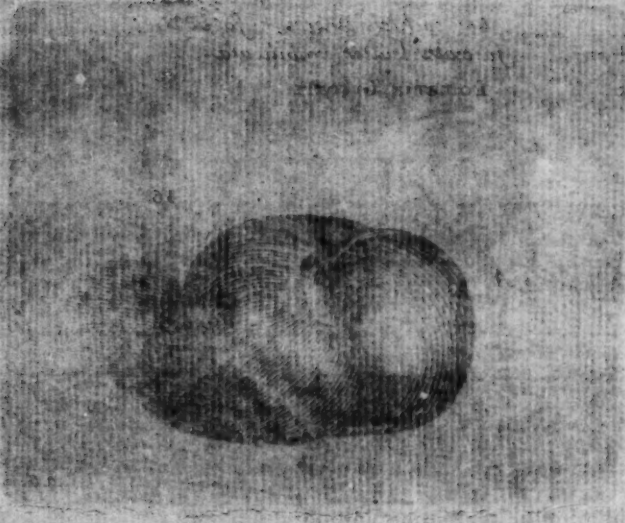
39 Buccam exiguum pullum duodecim orbium.

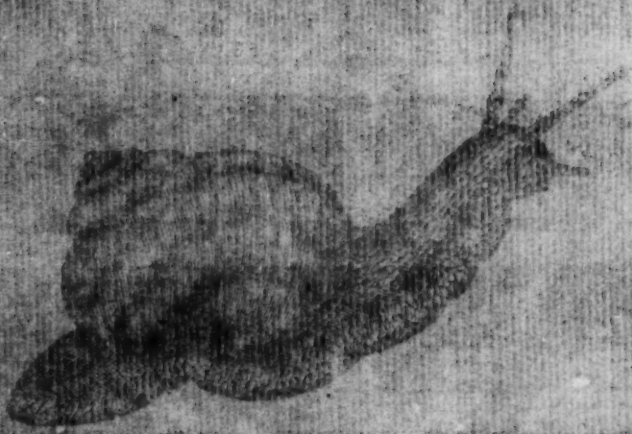
39 Succurre cælestium
psalmus quadragesimus
primus

46. cochlea cinereo rufescens, fasciata leuiter umbilicata.
Pomatia Gesneri

48.

Cochlea Pomatia, edulis Gesneri.

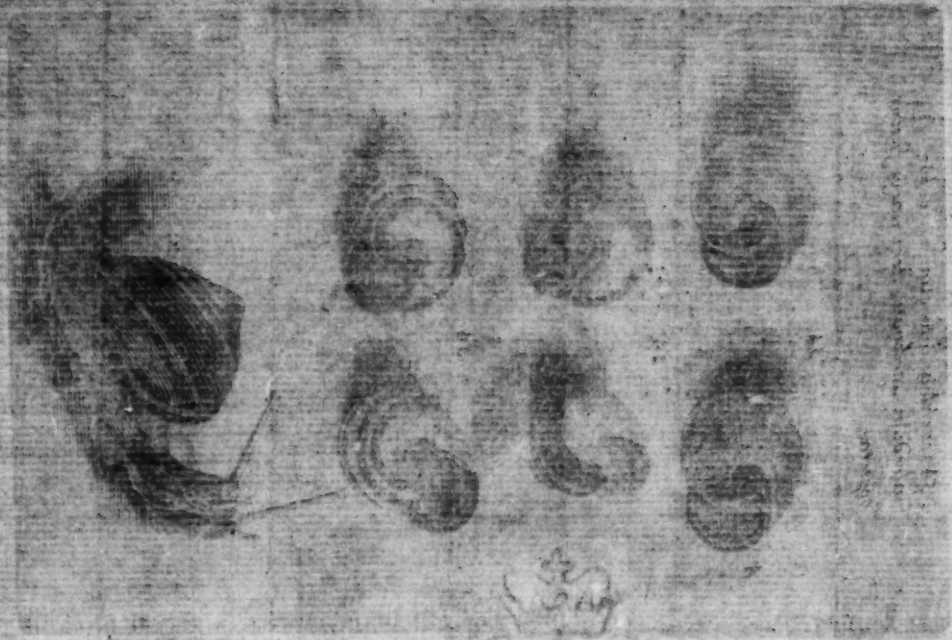




47 cochlea hortensis nostra, fusca, maculata, et fasciata.

53 cochlea maculata, unica fascia fusca, per medium orbem insignita.

54. cochlea interdum unicolor, interdum uariegata, item uaryis fasciis depicta.



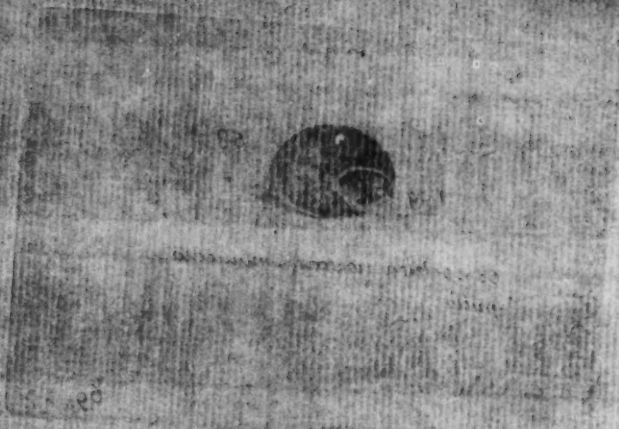
68. cochlea nostras umbilicata pulla.

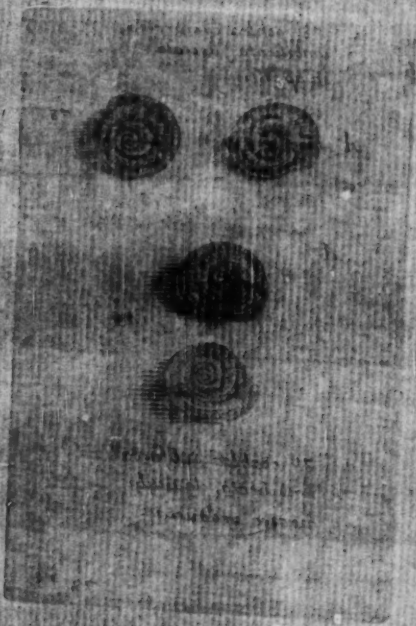
69

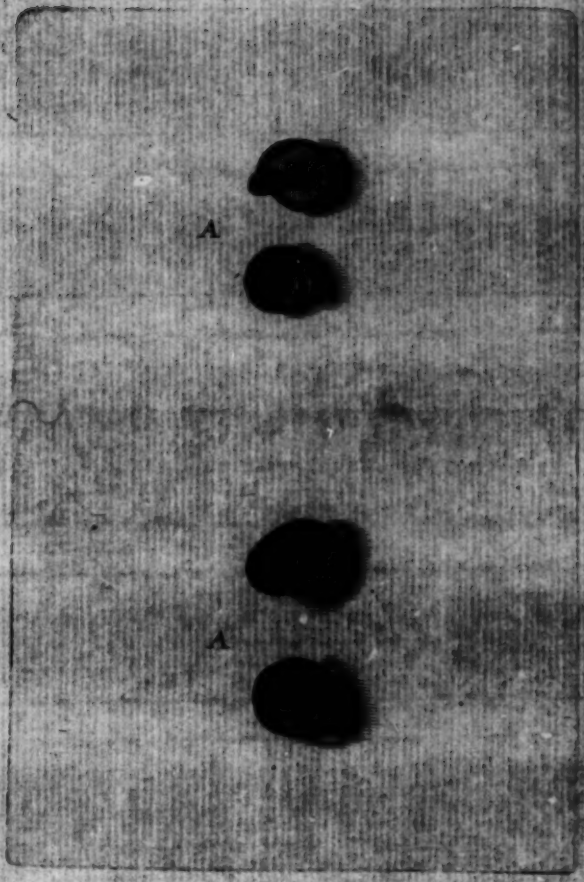
78. cochlea compressa, umbilicata fasciata campestris.

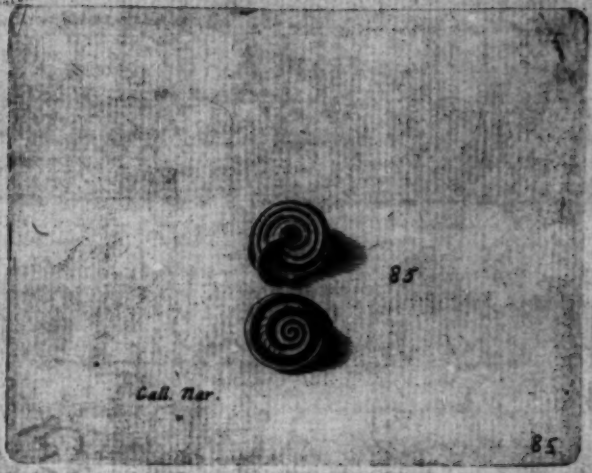
79. cochlea subfusca umbilicata, clavicula modicè producta.

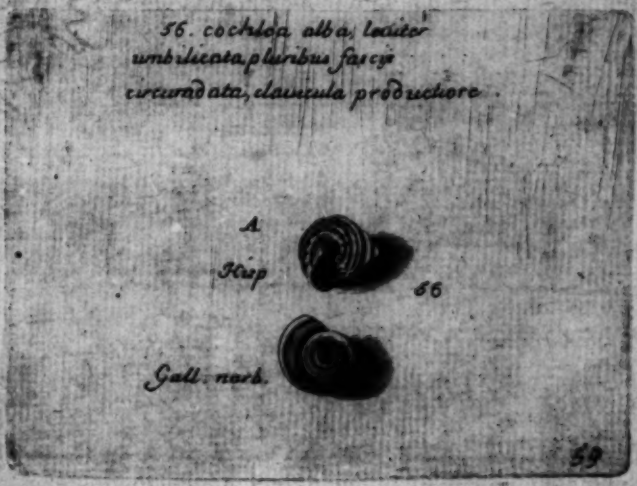
78 79

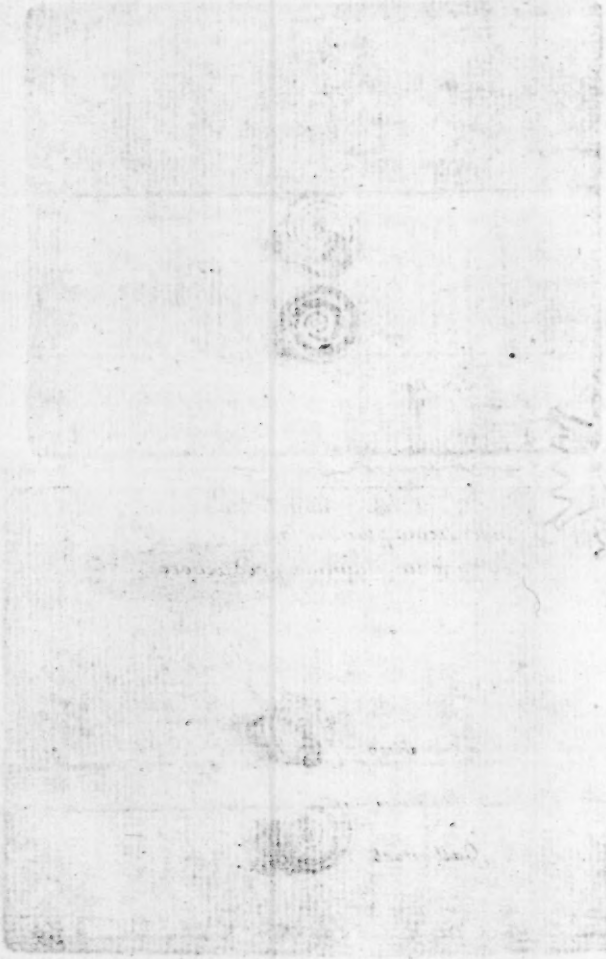




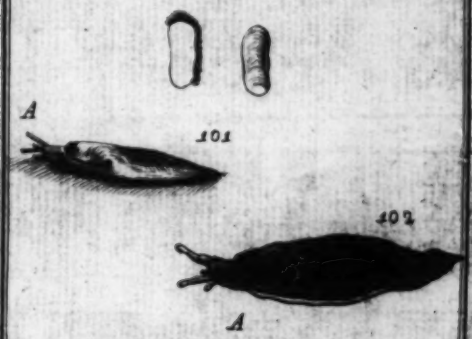

A
A


85
Gall. Nar.
85


56. cochlea alba, leviter
umbilicata, pluribus fasciis
circumdata, clavicula productiore.
A.
Hisp
56
Gall. narb.
59



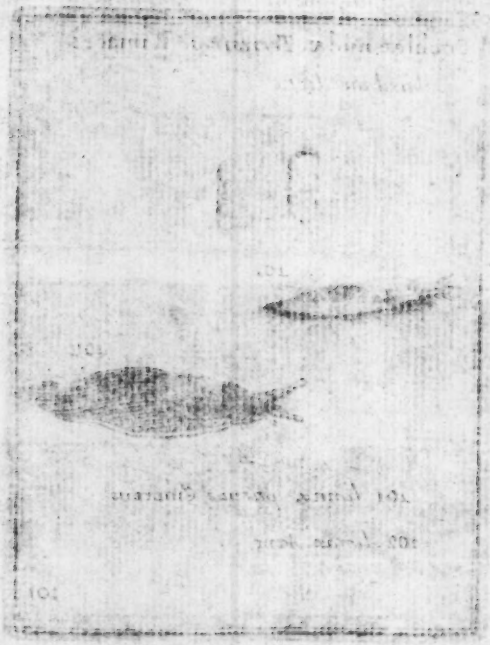
Cochleæ nudæ *Terrestres* Limaces *quibusdam dictæ*.




101. *limax parvus*, Cinereus

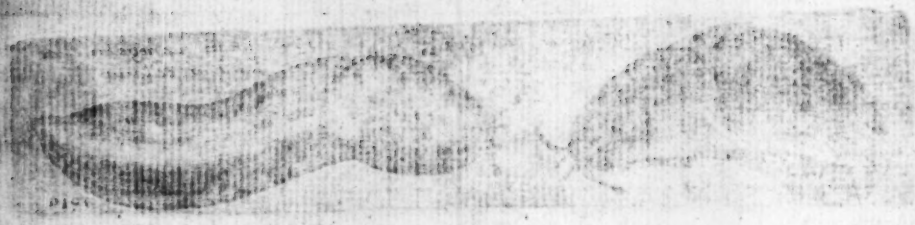
102. *limax* Ater,

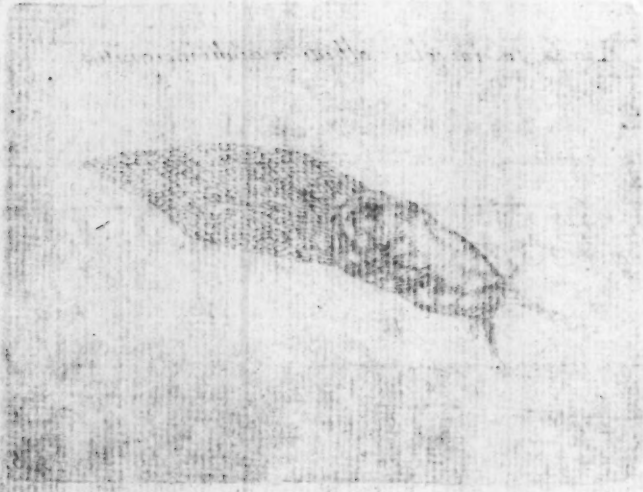
101



Limax, *Succini colore, albidis maculis insignitus.*

101.b





26. Cochlea vivipara Fasciata.

*Fluviatilis.*

26

A

126

32

A

32. *cochlea parua, pellucida, operculo testaceo cochleato claura.*

132

an idem cum 21?

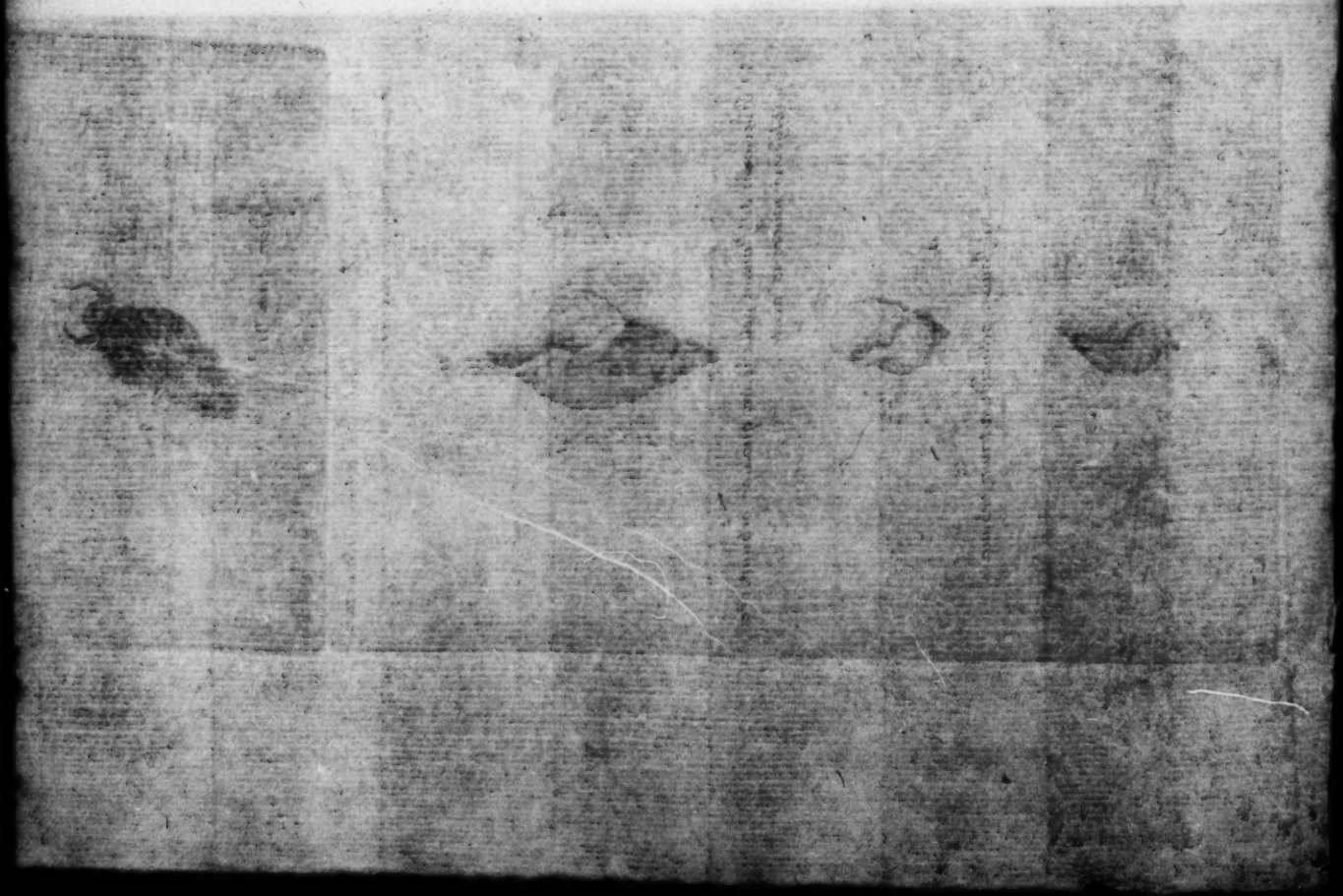
124

21. Buccinum subflavum, pellucidum, sex orbium, clavicula admodum tenui, productiore.

22. Buccinum subflavum, pellucidum quatuor orbium, ore amplissimo mucrone acuto.

23. Buccinum subflavum, pellucidum, trium orbium

123

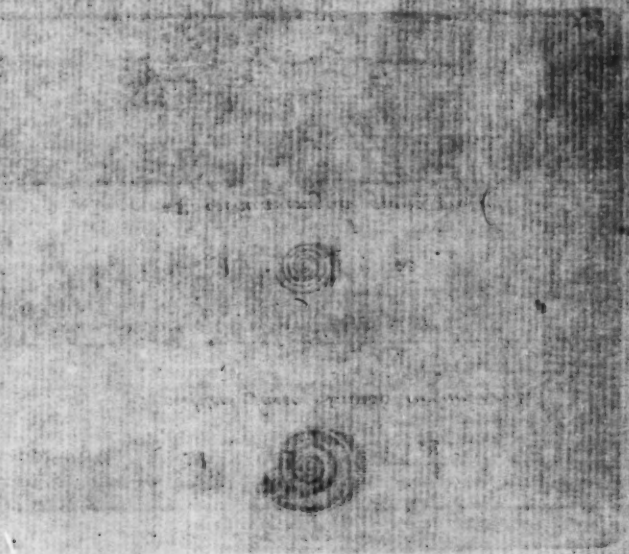


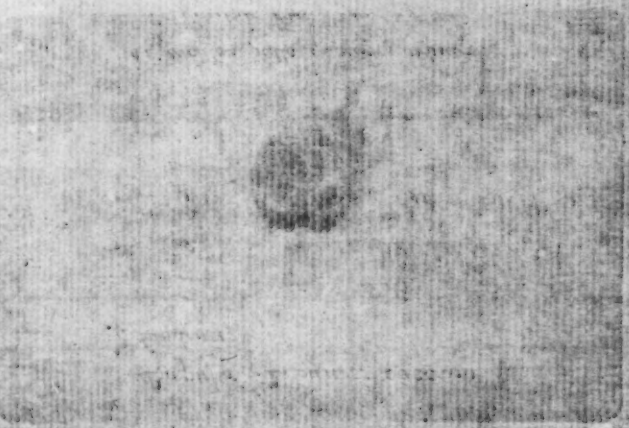
*Purpuræ Lacustres coccum fundentes.*

41 *cochlea pulla quatuor orbium.*

42. *cochlea fusca Limbo circum rapta.*

43. *cochlea exigua, quinq; orbium.*





38. Nerites Fluviatilis è caeruleo uirescens, maculatus, operculo sub-

A 38

-croceo aculeatoq; donatus.

39 Patella Fluviatilis, exigua Subflaua, uertice mucronato inflexoq;.

A

39

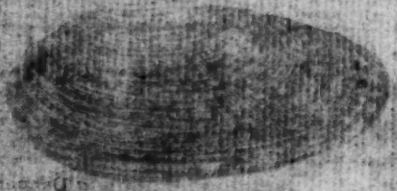
Sectio 1.

Musculis [illegible]atilibus.

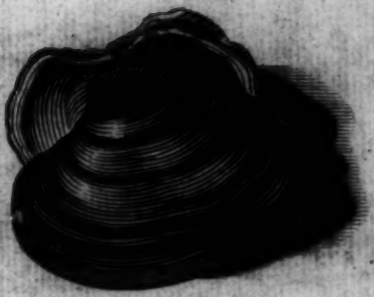
Cardine dentato.

a Danubio

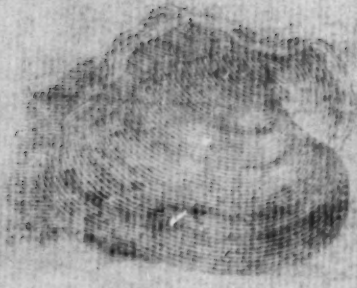
1. musculus ex flauo uiridescens medio dorso leuiter Radiatus, admodum crassus.



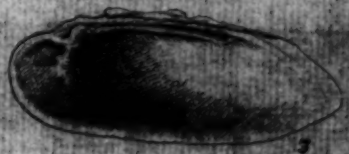
*Musculus Fluviatilis è Fluvio* Tamesi *ad* Battersey.



*an uitium 2.°*

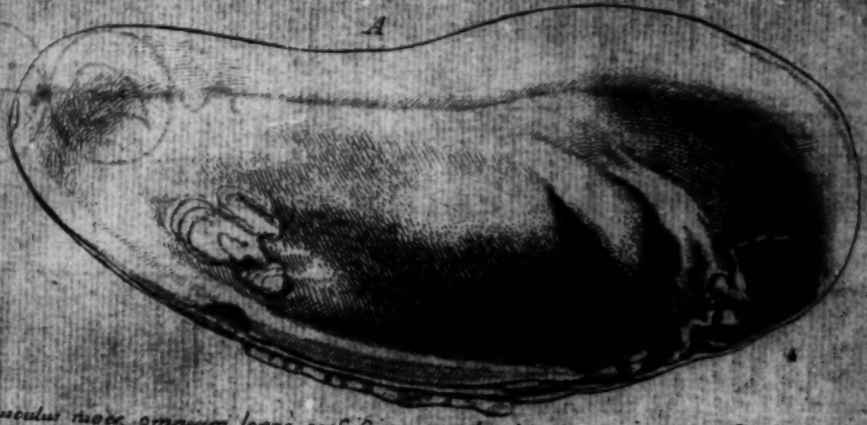


2. musculus angustior, ex flauo uiridescens medio dorso leuiter radiatus, cardinis pinna Suae denticulo Birido.



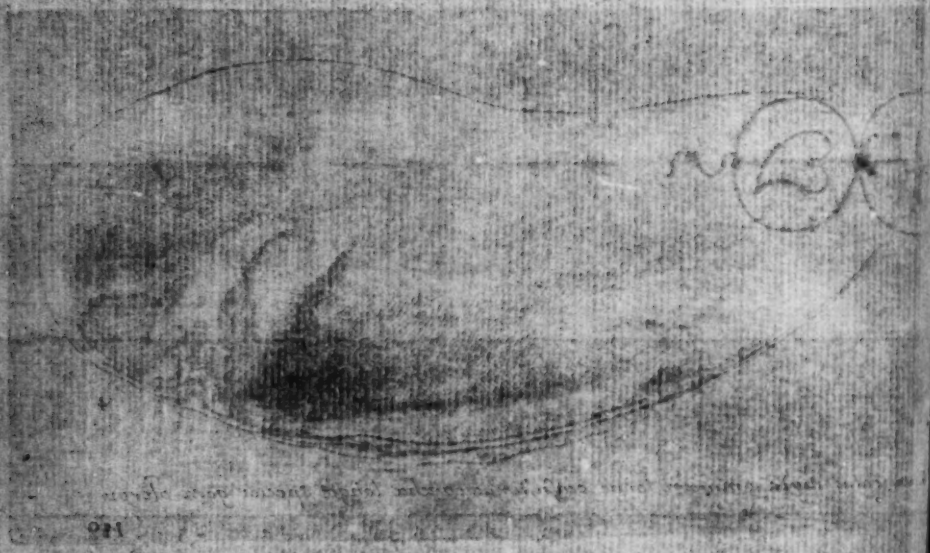

3. musculus angustus subflauus Suae Cirrinus.

147




4. musculus niger, omnium longe crassissimus conchae longae species gem. aldrou.

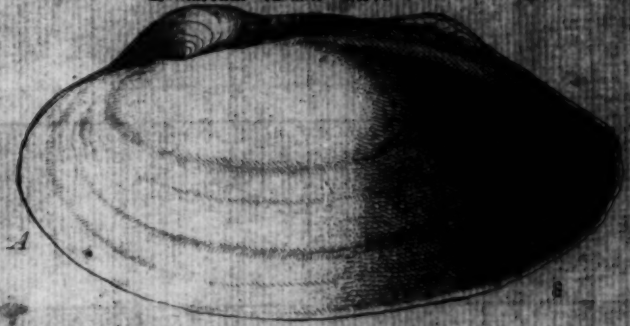
149



musculus latus, maximus et tenuissimus è cæruleo uiridescens, ferè palustris.

156

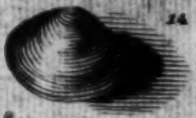
Sectio 2.
de musculis cardine Lævi




8. musculus tenuis minor Subruscus, latiusculus.

153

14. pectunculus subuiridis paruuus, subglobosus.
15. pectunculus perpusillus, rostratus.



159

Sectio 1. Cap 1

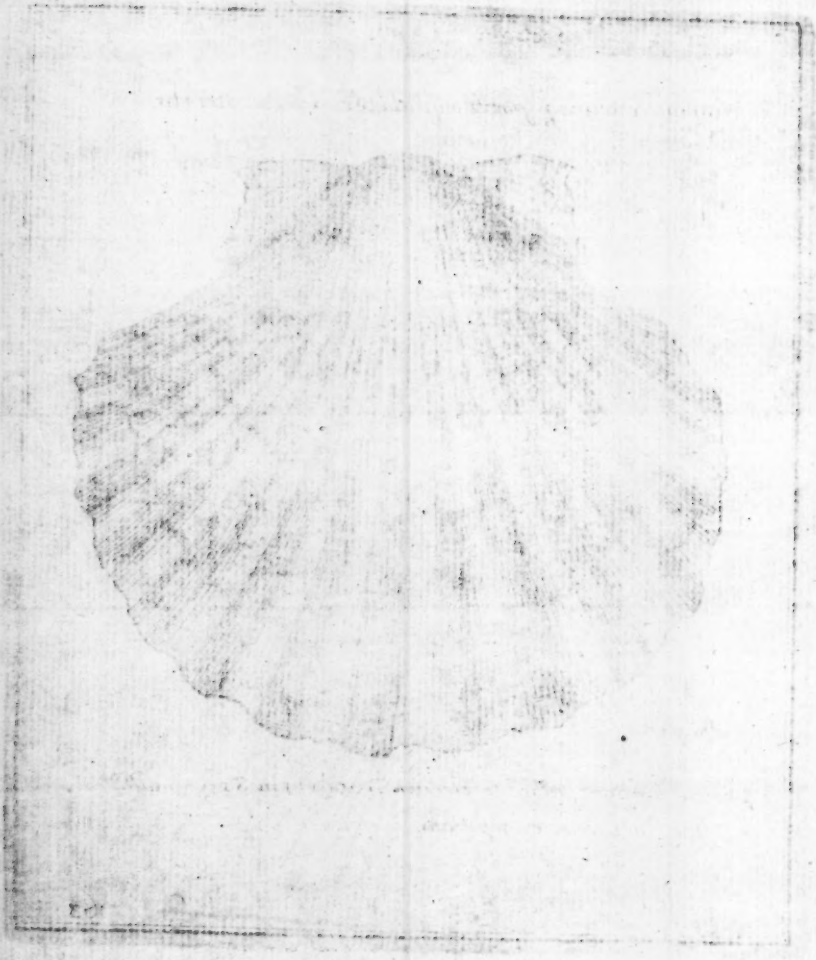
de

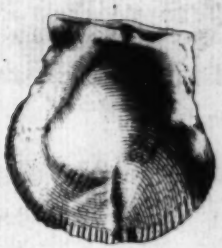
Pectinibus. exutraq; parte æqualiter Auritis, Striatis.

1

Angliæ.

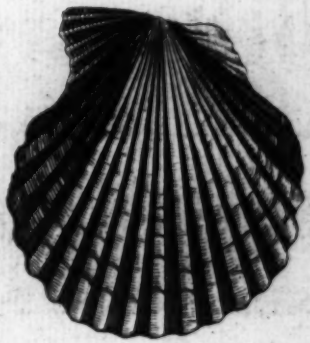
1. pecten magnus, albidus, circiter Duodecem Strijs, multis minutisq; incisuris exasperatis donatus.





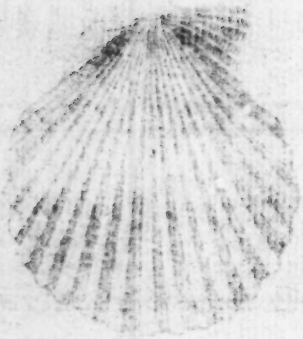

9. pecten minor ex Croco uariegatus, asper et fere sinuosus et inequalis lauiter et admodum crebrò striatus.

172




17. pecten subtilius, striis viginti quatuor ad minimum donatus.

180



18. idem cum Superiore n. 17

A

18

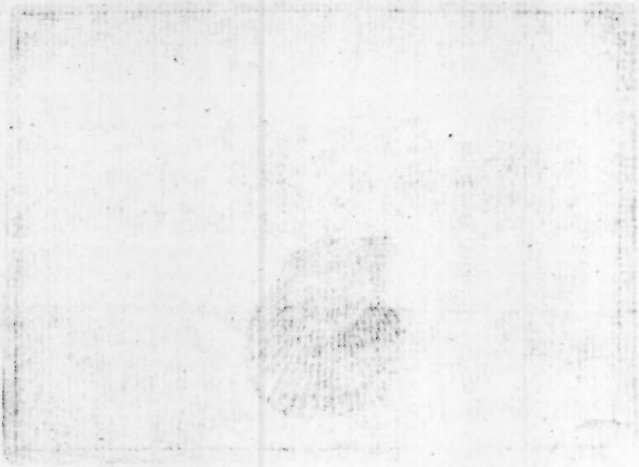
181

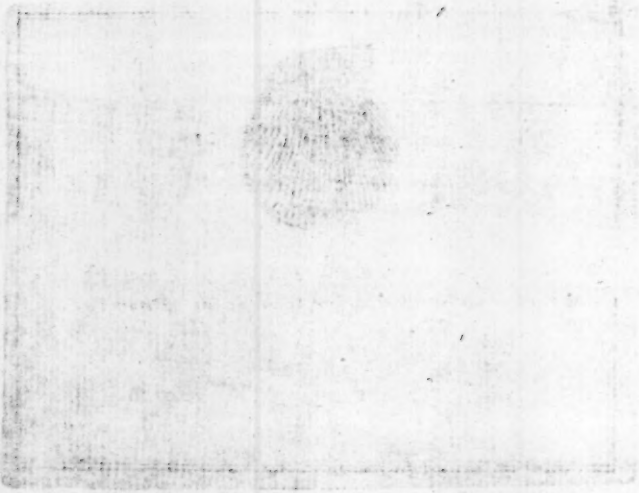
A

23

23. pecten parvus ex croco variegatus, tenuiter ad=
=modum striatus, alternis ferè stryis paulo minoribus.

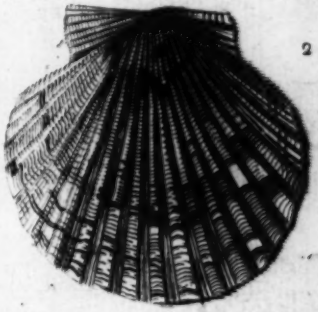
189





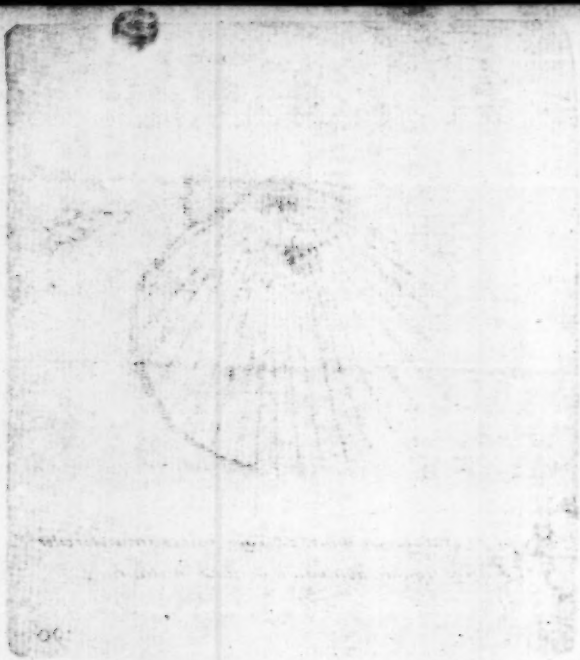
27. pecten mediocris latus, ex ruso uariegatus, circiter uiginti stryis tenuiter admodum striatis distinctus.

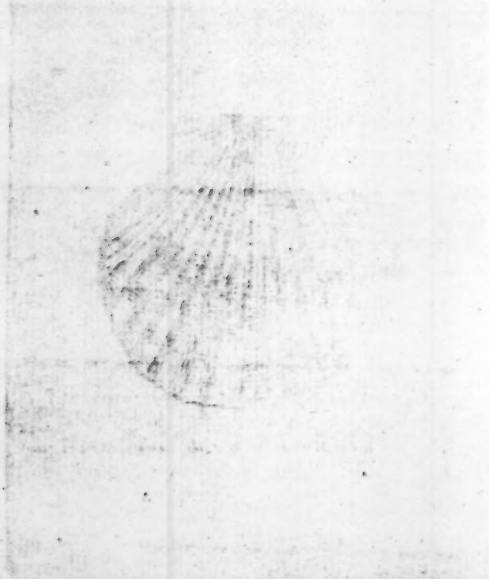
190




28. Idem cum Denticulis sub aure; et non nisi altera et Infima ualua est.

191





Apopeysi planâ & longa, recuruâ, angulo acuto desinente.

ostrea major sulcata mæqualiter utrinq ad cardinem denticulata.

31. ejusdem altera ualua plaua, Denticulata.

de ostreis Subter et posita

Apopeysi breui, quasi in occulto

A

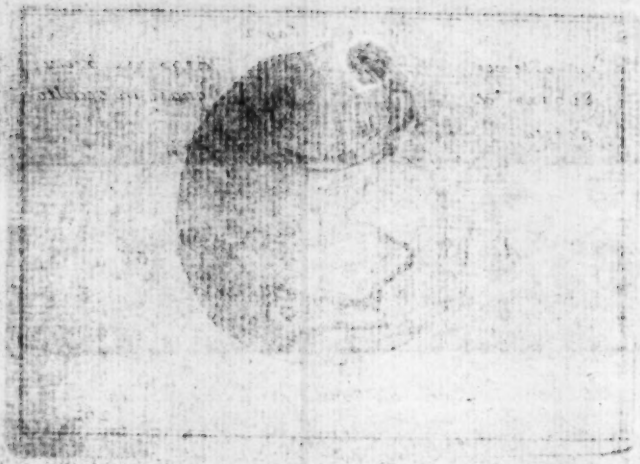
36

36. ostrea ferè circinata, Subuiridis leuiter striata.

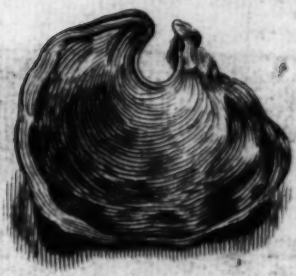


37. eadem Supina.

37



A



38



ostrea sylvestris rondeletij

39

39. ostrea laevis subpurpurea vel subaurea instar margaritæ intus et extrà resplendens.

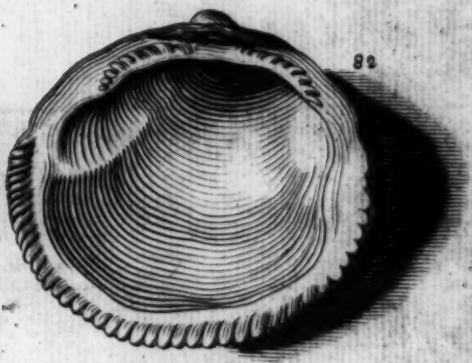
69

A J Garnszy

69. pecticulus exiguus, albus, admodum tenuiter Striatus.

235

Chama Glycymeris Bellonij.

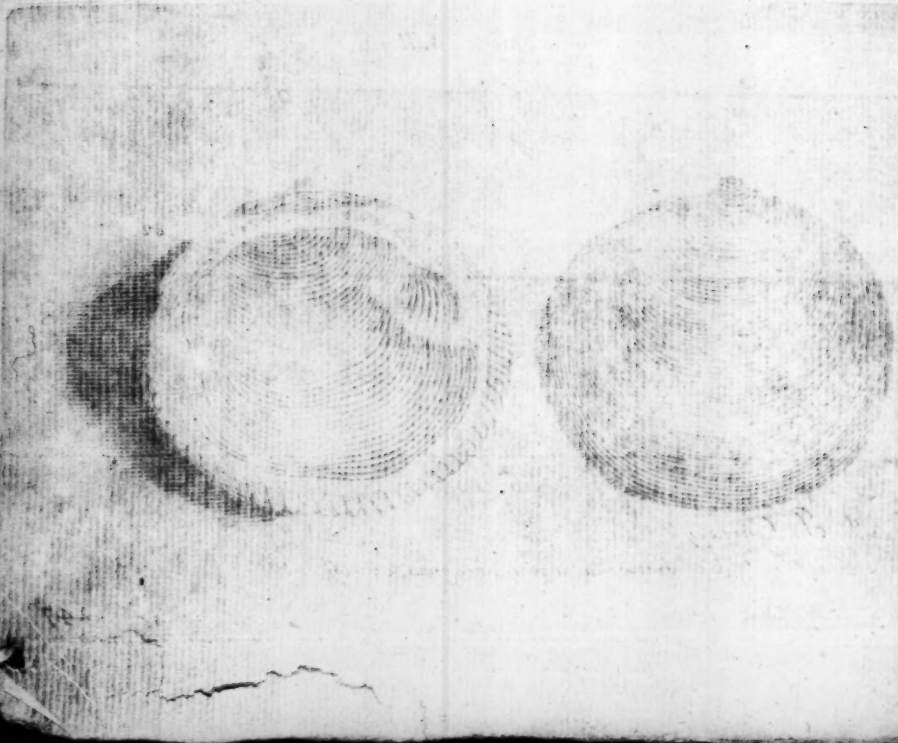


82

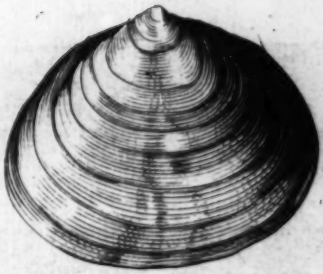
A. J. Garnsey.

82. pecticulus ingens, variegatus ex rufo.

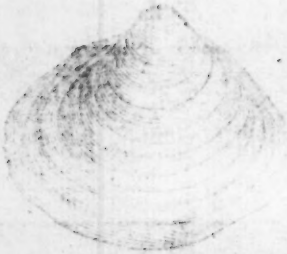
247

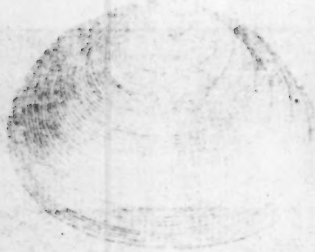


87. pecturculus crassiusculus, albidus.




88. pecturculus latus, admodum planus, tenuis, albidus.

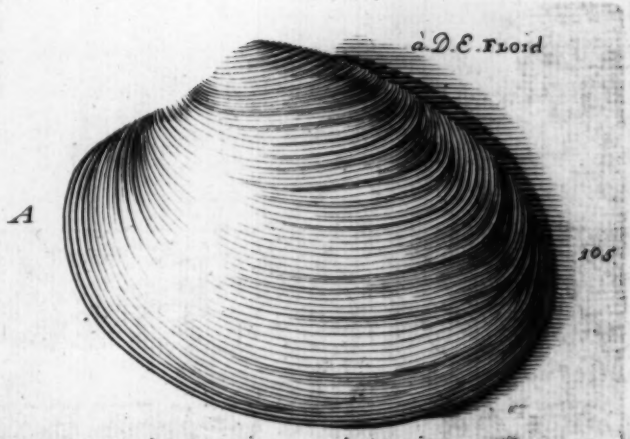




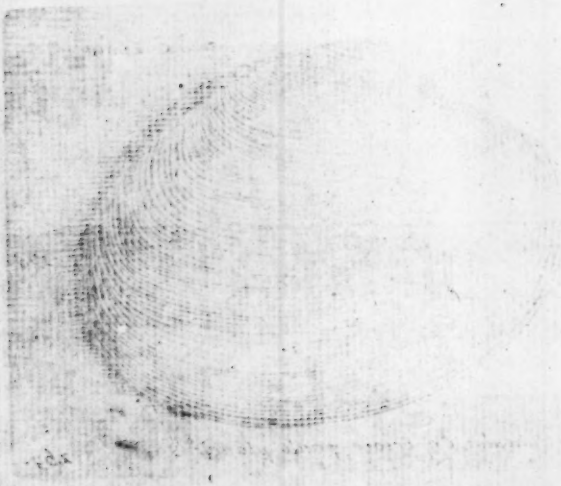
100. pecten tenuis, lenitèr purpurascens, radiatus, an idem cum Superiore?

mare mediter.

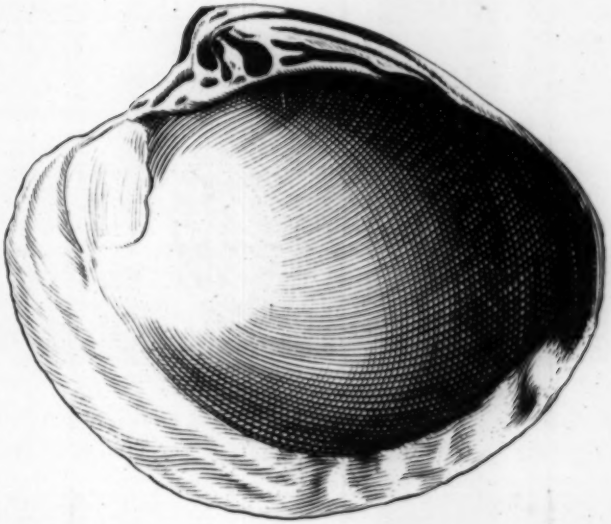
264




105. pecten, Superiore paulo planior. 269



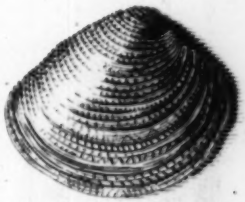
108. pectunculus maximus subfuscus, valdè grauis.



A

108

272

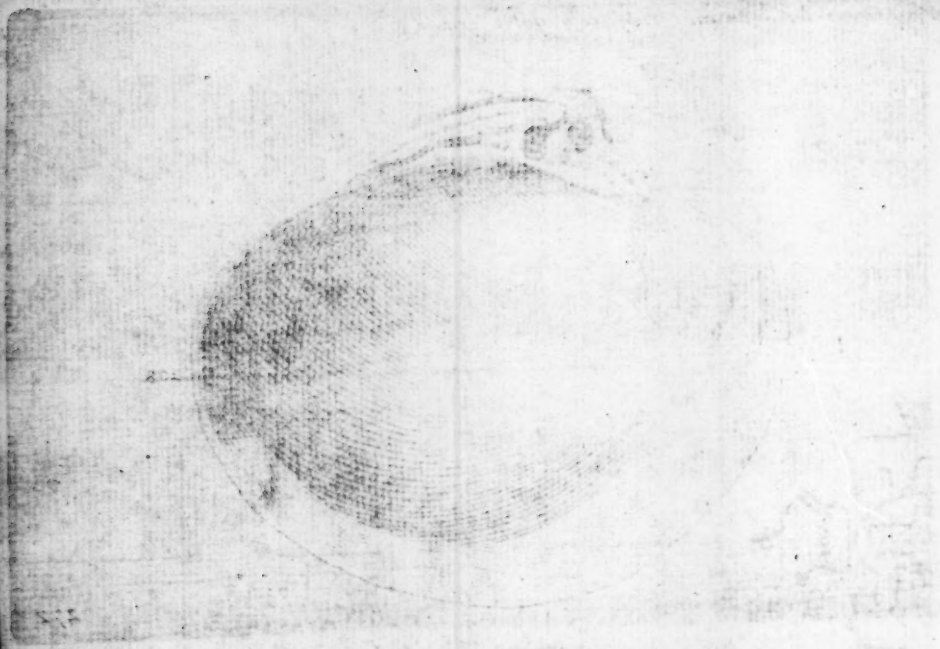


120

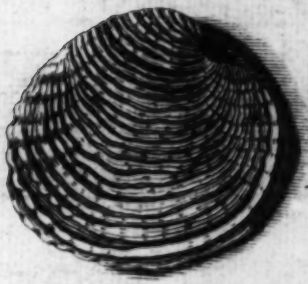
A

120. pectunculus fuscus densè fasciatus, eleganti quadam pictura undulata insignitus.

282



122. pectunculus omnium crassissimus fasciis ex latere bullatis donatus.



A

122

mar mediterr.

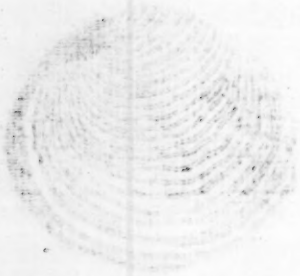
284.

126

A

126. pectunculus rostro productiore, capillaceis fasciis donatus.

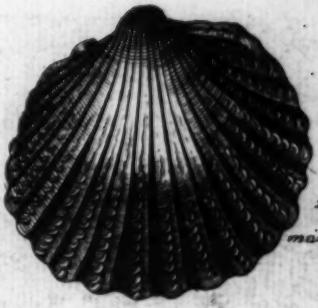
290



154. pectunculus exiguus, subfuscus.

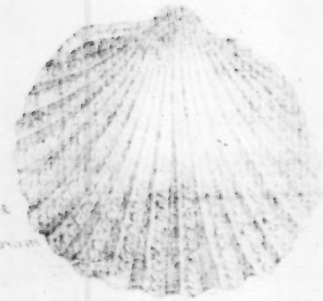
317

A




161. pectunculus orbicularis, fuscus striis medijs muricatis.

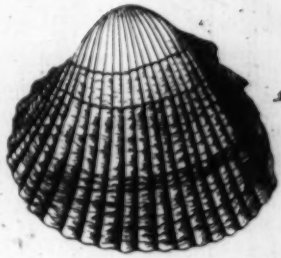
324

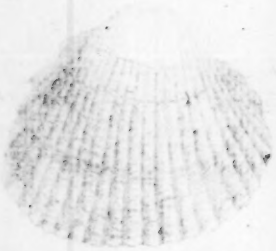


169 pectunculus subfuscus striis leuiter tantùm incisis.



171. pectunculus capite minore, rotundiore, et magis æquali margine.





127

A.

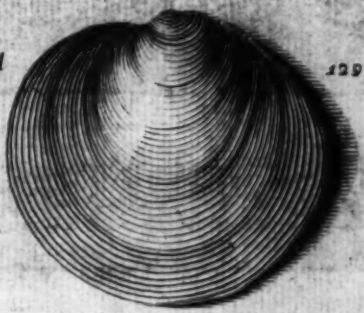
J. Garnsey.

127. pectunculus densè fasciatus, ex rubro uariegatus, et undatus.

291

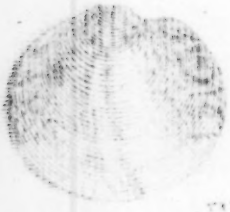
129. pectunculus Subfuscus, tenuitèr admodùm fasciatus.

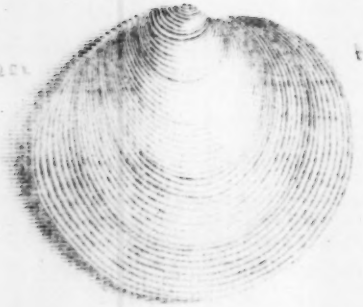
A



129.

293.





131

A

132

295

136. pecturculus planus crassus, ex rufo radiatus.

A

136

J Garnsey

299

200. musculus Subcæruleus, ferè Virgatus.

mytulus Rondel

200

A

201. musculus parvus, Subcæruleus latus, rostro tenui, adunco.

201

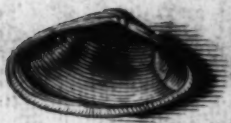
202

202. musculus parvus, albidus, tenuis, angustior, rostro tenui, recurvo.

217. tellina subfusca angustior, intus purpurascens.

A

217



218. an eadem cum superiore. n. 216?

meus

218

219. tellina purpurascens, margine sinuosa.

Jamaic

219

A
T. Garnsey.

232

232. tellina lata albida ex rubro radiata.

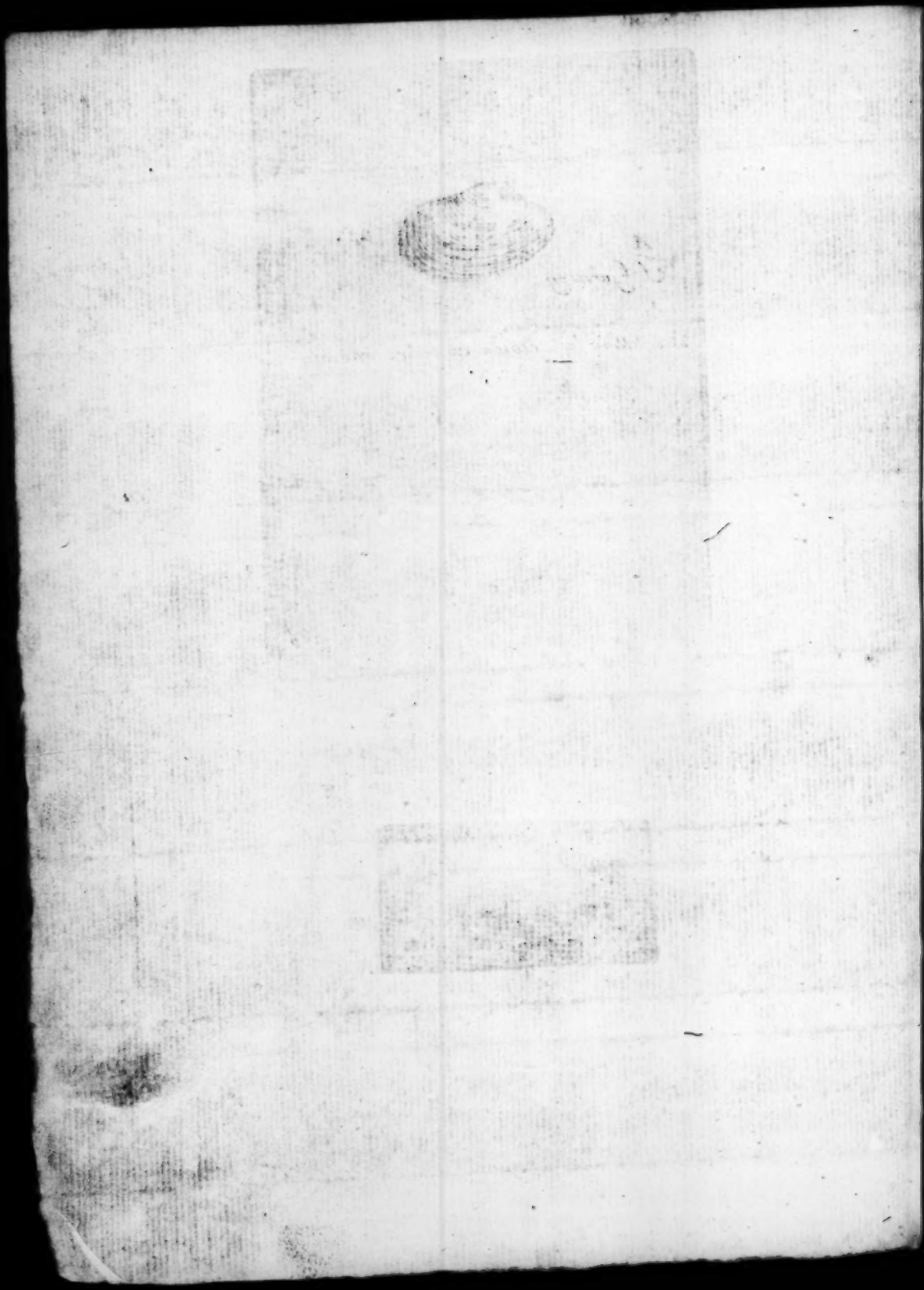
385

A

241

241. tellina ex rufo maculata
Testa exasperata

394



247

A

J Garnier

247 tellina fasciata, ex rubro variegata.

403

248

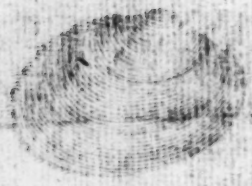
248 tellina fasciata angustior, intus lutescens, extra radiata.

A

249

249 tellina fasciata compactilis Subaurea radiata.

404

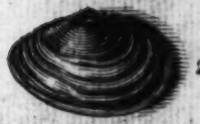


250. tellina parua, intus rubra ad alterum latus sinuosa.

251. tellina leuis, intus et extra rubra, ad latus sinuosa.

250

A



A

251

Secto. 9.

*Solenes i. d. est. Conchæ tenuibus longissimæ q. ab utraq. parte naturaliter hiantibus*

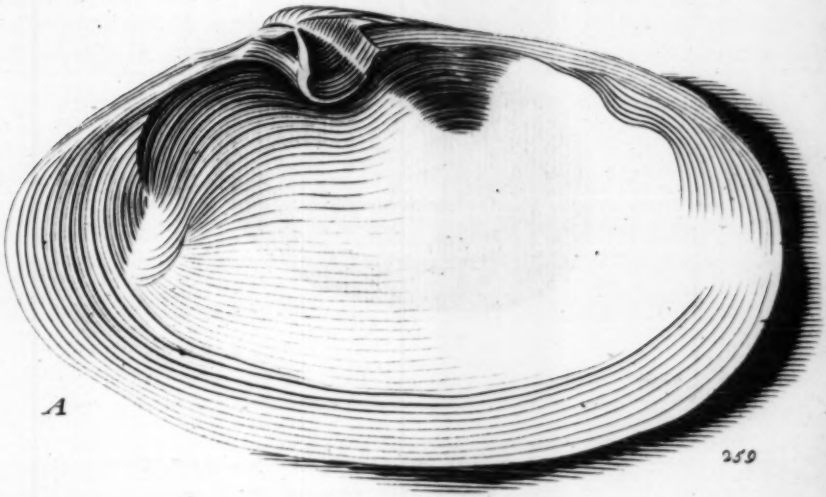
A

255

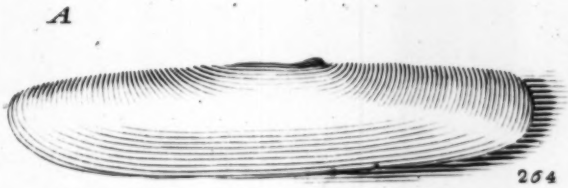
255. Solen major Subfuscus, Rectus.

409

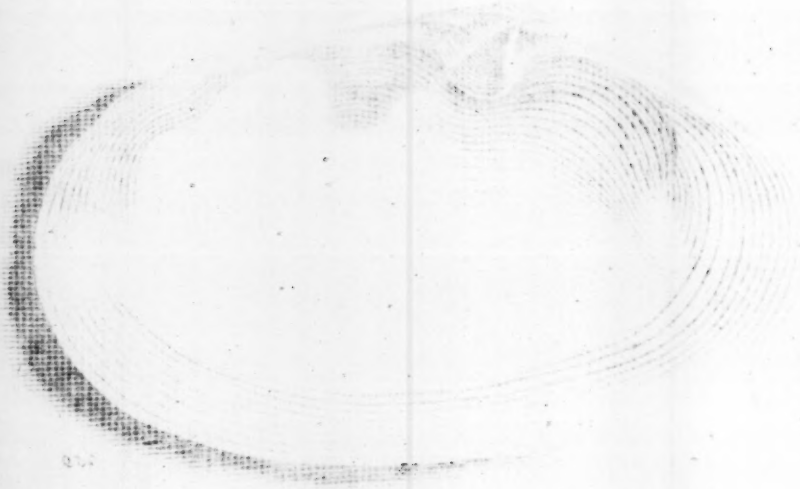
259. chama fusca, lata, planior.






264. chama subfusca, angustissima, ad Solenes quodammodo accedens.



271 chama fusca, Striis tenuissimis donata.

A

271

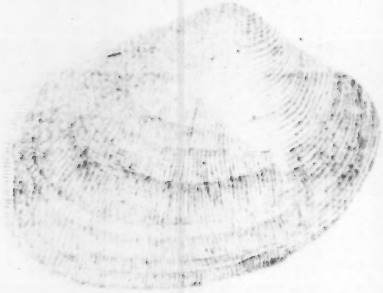
423

267. chamæ pholas angusta, parva, sinu utrinq; leviter muricato conspicua.

A

267

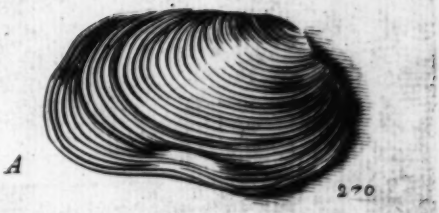
426



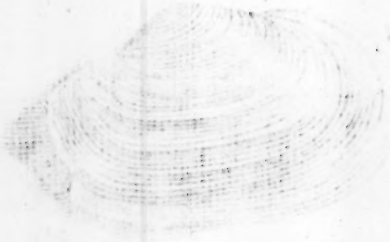
## Chamæ: Pholadibus

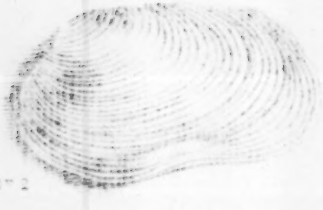
269. chamæ pholas, latus, ex alterâ parte obscurus, scaber sive rugosus.

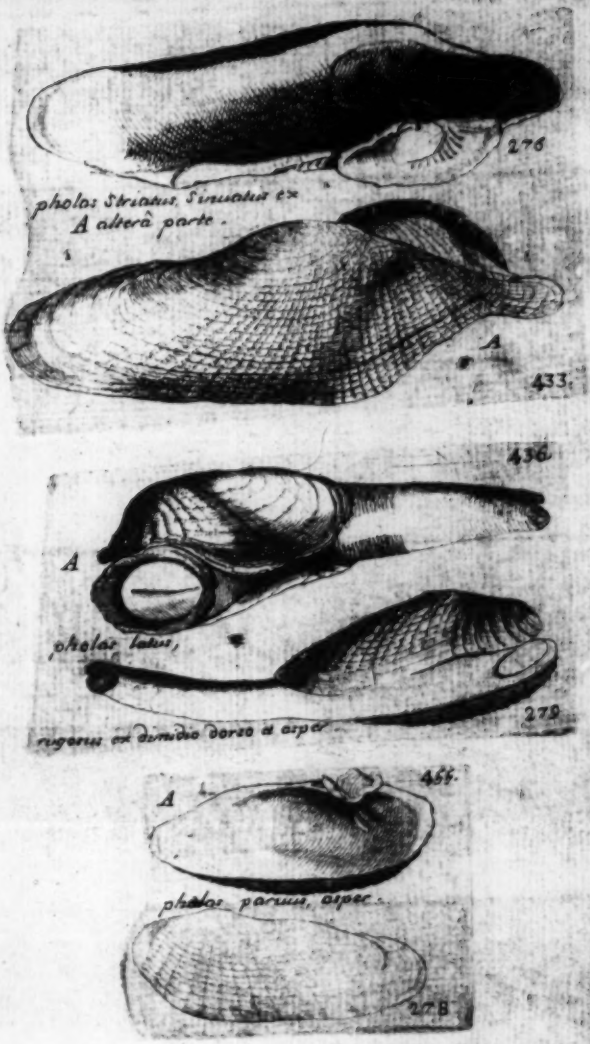





270. chamæ pholas fasciatus, ex alterâ parte intus violacea.

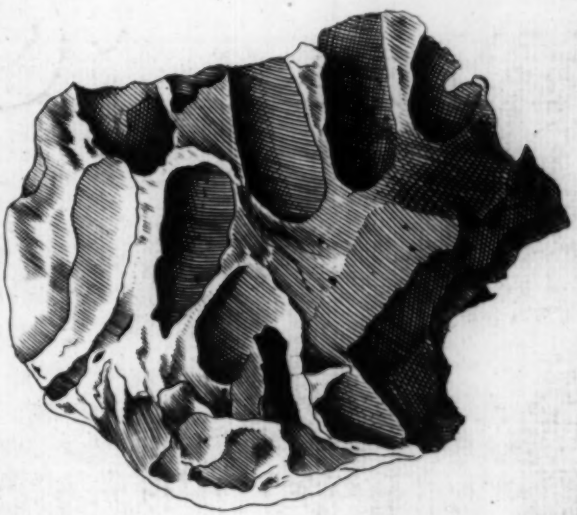





276
pholas Striatus, Sinuatus ex
A alterâ parte.
A
433.
436
A
pholas latus,
279
rugosus ex dimidio dorso et asper.
455.
A
pholas paruus, asper.
278

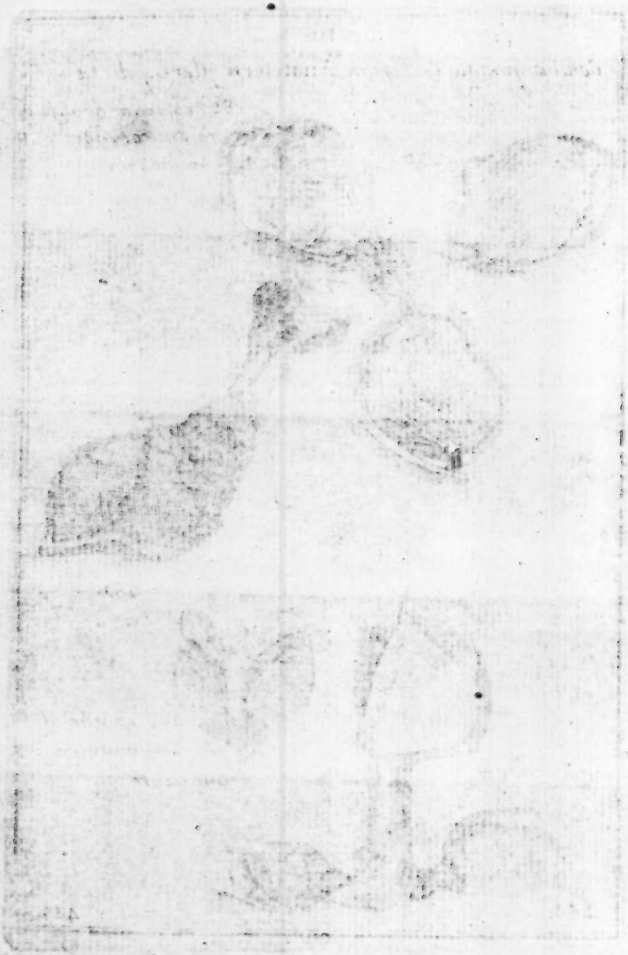
Pholadum *tertia testa, aliarum cardini Superinjecta.*

*Saxum pholadibus foratum.*



Sectio 2.

*Conchæ quinquelocularum, Anatiferæ plerisq; dictæ.*



A

287

287. Balanus parvus, Striatus.